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OCTOBER

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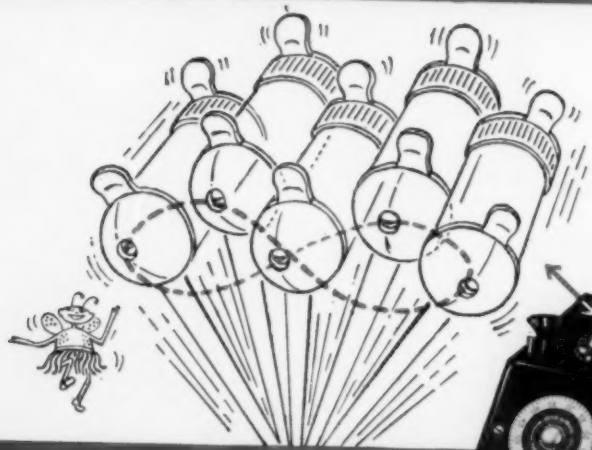

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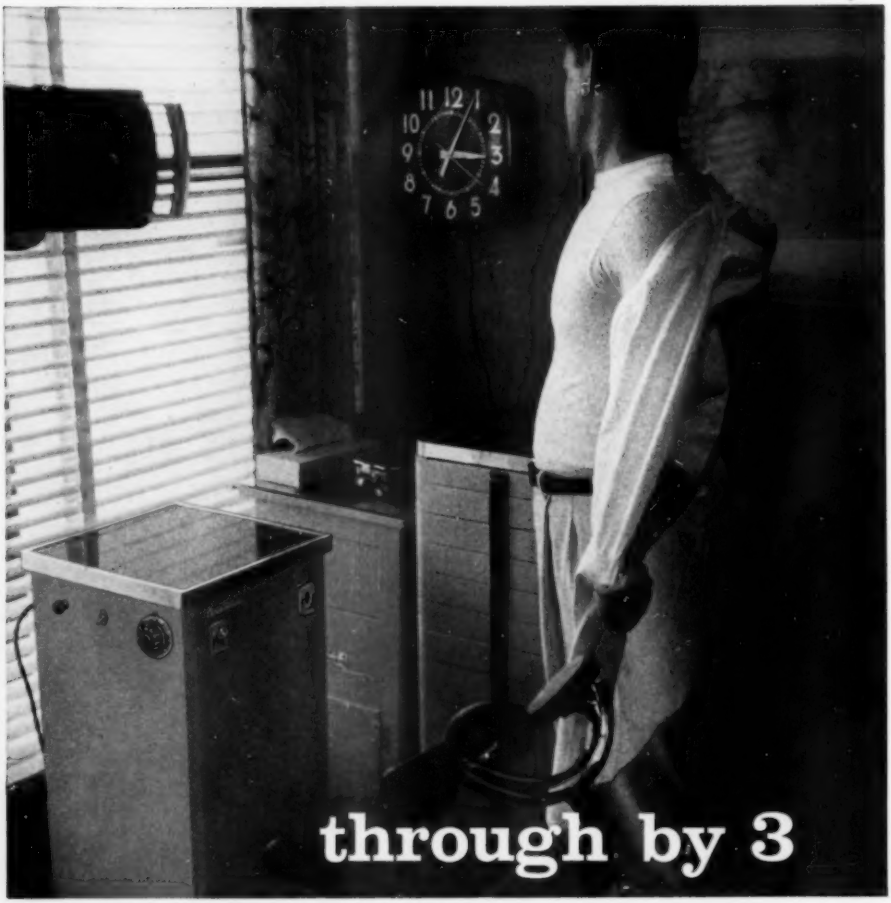

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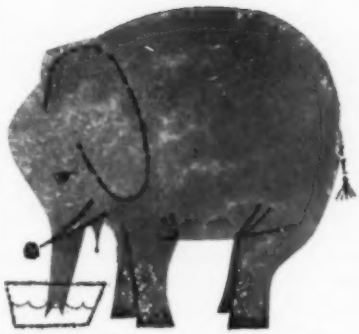

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1. Zach, L., and Brown, G. N.: N.Y. State D.J., Jan. 1956
2. Friedman, J., Lite, T. and Solomon, H.: N.Y.J. Den., Apr. 1956
3. Van Huysen, G., Healey, H. and Patterson, S.: U.S.A.F. Med. J., May 1956
4. Butt, B., Harris, N., Shannon, I. and Zander, H.: I.A.D.R. Abstracts, No. 34, 1956
5. Zinner, D., and Whetstone, W.: J. Den. Child., Mar. 1956

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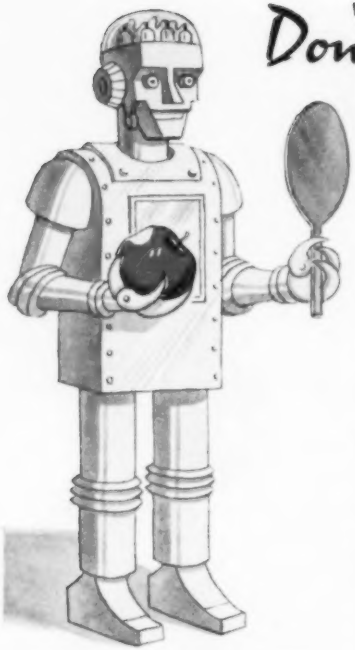

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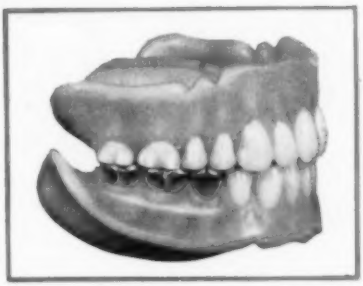

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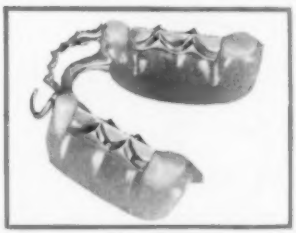

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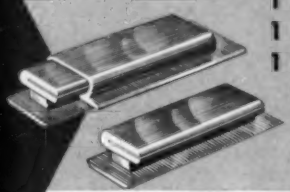

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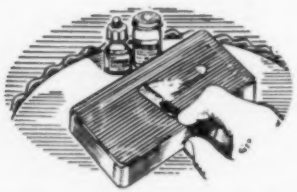

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VOLUME 53 • NUMBER 4

Proximal contour of Class II amalgam restorations made with various matrix band technics

Ralph W. Phillips, M.S.; Cosmo R. Castaldi,† D.D.S., M.S.D.; Joe R. Rinard, D.D.S., and Robert J. Clark, D.D.S., Indianapolis*

Amalgam, with its many facets, has been the subject of numerous investigations. Little objective analysis has been made of the matrix itself and the variables associated with its use, however, as compared with the other steps involved in building the amalgam restoration.

Black[1] recognized the importance of the matrix and described several types. Green and Shellman[2] briefly reviewed the history of dental matrixes. They pointed out that they began as simple wedged strips of band material inserted between the teeth. The idea of separating the teeth by a screw wedge in order to compensate for the thickness of the band material was adopted from the gold foil operators. Separators and matrix holders of this type were known by such names as Woodward, Perry, and Ferrier. Many of these were found to be cumbersome, unadaptable, and time-consuming to insert.

Numerous other mechanical devices have been developed through the years with each type having advantages and disadvantages. The Ivory and the Tofflemire retainers have utilized, for gingival constriction, a band cut in a definite pattern. Some retainers, such as the Sigveland, have obtained constriction by a special design of the retainer itself. For adequate support of the band and to pre-

This research was supported in part by a contract AF 18 (600)-433, from the School of Aviation Medicine, United States Air Force.

From the department of dental materials, Indiana University School of Dentistry.

*Associate professor and chairman of the department of dental materials, Indiana University School of Dentistry.

†Assistant professor of pedodontia, Indiana University School of Dentistry.

1. Black, A. D. G. V. Black's work on operative dentistry, ed. 7, vol. 2. Chicago, Medico-Dental Publishing Co., 1936.

2. Green, R. D., and Shellman, J. P. Manipulation of amalgam. J.A.D.A. 30:1168 Aug. 1943.

vent yielding of the matrix during heavy packing pressure, Hollenback,[3] Miller,[4] Markley,[5] Sweeney[6] and Romnes[7] have advocated the addition of compound reinforcements on the buccal and lingual surfaces. Markley and Miller also feel the matrix band should be contoured to reproduce the lost structure and to gain harmony with the supporting tissues.

While the search for an ideal universal matrix goes on in a rather empirical manner, the exact relationship between proximal contact and contour and the periodontal tissues has received some attention. Johnson[8] and Aiguier[9] have commented that improper contour might be a predisposing factor to periodontal disease. Miller[4] is concerned about the periodontal changes that he states are produced by the flat proximal surfaces and the improperly placed contact areas that may result from an uncontoured matrix band. Stibbs[10] has argued that it is within the power of the dentist, if he follows good basic principles carefully in his restorative procedures, to prevent periodontal disease. Although it is generally believed that improperly contoured restorations or those which do not restore proper contact will influence the health of the periodontal tissues or the cariogenicity of noncarious approximating surfaces,[11,12] further carefully controlled *in vivo* studies are needed for corroboration of these clinical observations.

It is recognized that there are many factors that must be considered in properly evaluating different matrix band technics which are currently being used. Of primary importance are the contact and contour and the gingival overhang of the resulting restoration. Factors other than the matrix itself that might influence the contact and contour are cavity type and size and the amount of condensation pressure. This particular study will deal only with the contours that result from the various matrix band technics and the cervical overhangs which are thereby induced.

PROCEDURE

It is well known that the contact and proximal contour of teeth vary a great deal in different individuals. Fee[13] examined the teeth of 12,000 patients, and his results corroborated previous studies which showed that there are three basic tooth forms and that they can be classified as square, tapering and ovoid. He described the contacts and proximal contours of these teeth in great detail.

The first step in the investigation herein described was the selection of specimens of human extracted teeth that would be representative of these three basic tooth forms. From a large collection of teeth, a mandibular right second molar, first molar and second bicuspid were selected for each of the three types. All of the teeth were cleaned of debris, and if the specimen showed proximal abrasion, the abraded areas were restored to the original contour with inlay wax. The samples chosen were of uniform size, and when set up in contact closely represented a section of the posterior arch. All of the teeth and their positions when in contact were then checked by Richard A. Misselhorn, chairman of the dental anatomy department, Indiana University School of Dentistry.

It was decided to study restorations

3. Hollenback, G. M. Economic value of amalgam in operative dentistry and the technic of its use. J.A.D.A. & D. Cosmos 24:1318 Aug. 1937.

4. Miller, E. C. Clinical procedures which affect amalgam restorations. North-West Den. 27:173 Oct. 1948.

5. Markley, M. R. Restorations of silver amalgam. J.A.D.A. 43:133 Aug. 1951.

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9. Aiguier, J. E. Preventive measures in periodontology. J.A.D.A. & D. Cosmos 25:15 Jan. 1938.

10. Stibbs, G. D. Role of operative dentistry in the prevention of periodontal disease. J.A.D.A. 45:645 Dec. 1952.

11. Simon, W. J. Personal communication.

12. Ziegler, J. E. Personal communication.

13. Fee, A. H. Contacts and contours. J.A.D.A. 27:1035 July 1940.

placed in the following types of preparations in each of the three basic types of teeth—distoocclusal and mesioocclusal cavities on mandibular first molars and distoocclusal cavity on a mandibular bicuspid. In order to describe the method that was used to evaluate the various matrix technics, an example of one particular series will be described. This same procedure was used for all restorations.

A rubber base impression material was used to take impressions of the crowns and part of the root portion of the mandibular molar and bicuspid. An additional impression was taken of the mandibular bicuspid. Self-curing acrylic resin was painted into the impressions until the molds were filled. In order to form a tapering peg, a small amount of wax was added to the root portion. A distoocclusal cavity, in accordance with Black's principles, was prepared in one of the acrylic duplications of the mandibular bicuspid. All three duplications were then cast in Nobilium.

It was necessary to record an original standard proximal contour to which the contours of the subsequent restorations could be compared. A plaster impression was taken of the distal surface of the unprepared metal tooth. This impression was then transferred and attached to the distal surface of the metal tooth which had the cavity preparation. The cavity was now condensed with amalgam, the proximal contour being formed by the tightly adapted plaster impression. The occlusal surface was carved, the impression removed and contour measurements taken in the manner to be described. These standard readings then served as the control for future comparison with amalgam restorations placed in the same tooth.

The metal teeth, mandibular bicuspid and molar were set up in contact and a plaster splint made of the occlusal surfaces. By means of the plaster splint, the two teeth were transferred to an acrylic block and imbedded with a self-curing resin. The root portion of the mandibular molar was lubricated so that it could be removed. Then this block with the teeth in place was mounted on a stationary acrylic platform in such a manner that it could be rotated and locked in different positions for the subsequent photographs.

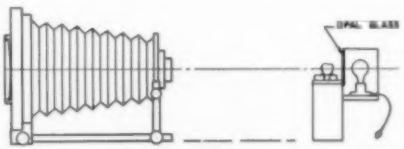

Fig. 1 • Method used for recording the silhouette of proximal contour

The method devised for recording the proximal contour is diagrammed in Figure 1. The teeth were silhouetted by means of a 100 watt bulb and the camera was mounted in a fixed position. Under these standardized conditions it was possible to obtain a sharp and accurate silhouette of the tooth contour. Silhouette photography similar to this was employed by Lasater[14] in studies on wax distortion. The mandibular molar was temporarily removed during the photography and, by rotating the block on the axis, the following silhouette photographs were taken of the mandibular bicuspid (Fig. 2):

1. Buccolingual view through the contact area.
2. Buccolingual view with tooth rotated a constant degree in a clockwise manner.
3. Buccolingual view with tooth rotated a constant degree counterclockwise.

A direct photograph was also taken of the proximal surface, and this negative was subsequently used to measure the cervical overhang. A rubber base impression material was used to duplicate the gingival tissues. Since the mandibular molar was not securely fastened to the

14. Lasater, R. L. Control of wax distortion by manipulation. J.A.D.A. 27:518 April 1940.

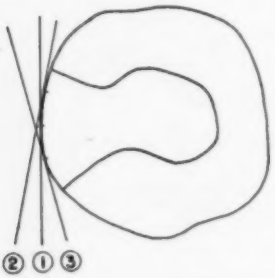

Fig. 2 • Diagram of the three positions of the tooth. Silhouettes were taken at each angle of the proximal surface

block, it was noted that when a wedge was placed between the two teeth, a small amount of movement, closely approximating oral conditions, existed.

The particular matrix to be studied was now placed on the mandibular bicuspid and the distoocclusal cavity was hand condensed. After condensation, the matrix was carefully removed. The occlusal excess was removed with a Walls no. 3 carver, and the interproximal embrasure was trimmed with Wilson knives (Wesco no. 47). Any buccal or lingual excess that could be reached with Wilson knives was removed. No further attempt was made to alter the proximal contour except to brush away the amalgam crumbs. Photographs similar to those taken of the original contour were now made of the restored tooth. The packing procedure and photographic analysis were then repeated for the same matrix technic by a second investigator. A minimum of four restorations was studied for each method and the mean results are shown.

The following types of matrix retainers and technics were used: (1) Tofflemire, (2) Sigveland, (3) Ivory no. 1, (4) Ivory no. 8, (5) Universal matrix-holder,[15] (6) technic advocated by Hollenback,[3] (7) technic advocated by Miller,[4] (8) technic advocated by Markley.[5]

It is recognized that other retainers and technics are employed but it was felt that these were representative. The technics of Miller, Markley and Hollenback were used as outlined in the publications cited. It should be remembered that, although their names are associated with a particular technic, these individuals may now have altered that method to some extent. Certainly, however, the technics as described are identical to ones that are commonly employed. Briefly, the Miller technic employs a compound reinforced and wedged band (.002 inch thick). The band extends well below the cervical seat and above the marginal ridge. With Markley's technic, a thinner (.0015 inch) band material is used. It is held at the cervical margin by dental tape threaded through two holes located at the gingival corners of the band. The two technics also differ slightly in the instruments used for contouring. The Hollenback procedure advocates wedging but no contouring.

Each of the five mechanical matrix retainers with the following procedures were studied: (1) uncontoured and unwedged; (2) uncontoured and wedged, (3) contoured and unwedged, (4) contoured and wedged. By this series of tests it would be possible to isolate the relative influence of both contouring and wedging.

Several methods for quantitatively measuring the reproduced contours were considered, and the following procedure was found to be accurate and workable. The photographic plate of the original contour was placed in a projector maintained in a fixed position. The silhouette, at 10 power magnification, was projected onto a graph calibrated in millimeters. (Thus it was possible to make readings of less than 0.1 mm. on the actual tooth contour.) Starting from a set position, readings were taken at half millimeter

15. Retainer and band material supplied through the courtesy of Dr. Joseph Muller, Fribourg, Suisse.

intervals occlusocervically. Thus the actual mesiodistal width of the tooth was measured at 12 to 14 different locations.

Figure 3 shows a diagram of the procedure. A contour of a typical tooth is sketched at the left and drawn to scale are the locations of the various positions where measurements were made. The first two readings, on an ovoid tooth, actually lie above the greatest convexity of the tooth, while readings 11 and 12 are below the cervical margin. Having established definite measurements for the original, the contours of the restored surface were now measured in the same manner. The deviation from the original was expressed in tenths of a millimeter, and a graph constructed as shown at the right of this diagram. If there was no deviation from the original, or in other words, if the original contour was reproduced perfectly, the difference would be zero and would appear on the vertical line. If the reading was greater than the original, it was plotted to the right of the vertical line, and if it was less than the original, it was plotted as a negative reading to the left.

It must be understood that this curve does not represent the actual contour of the proximal surface; rather it depicts the deviation, plus or minus, from the original at specific points on the occlusocervical axis. Thus by studying this graph it is possible to make several observations. The general contour of the restored tooth as compared to the original can be visualized and gross deviations, plus or minus, are evident. Naturally the more closely the graph coincides with the vertical line, the more nearly is the original contour reproduced. At the gingival margin, position 10, the location of the curve depicts the actual overhang, mesiodistally, that is present. To determine the overhang from the occlusocervical aspect, the photograph taken directly into the proximal surface was projected onto the grid and the maximum overhang, below position 10 or the gingival margin, was recorded. These values are plotted on a separate graph.

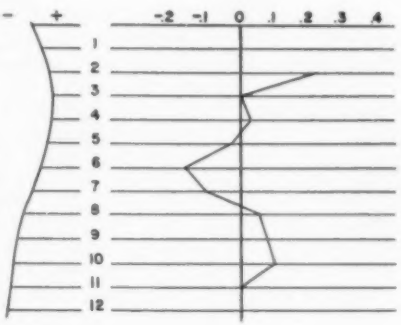

Fig. 3 • Diagram of method used for measuring contour. At left is seen a typical tooth contour and the location of 12 positions where readings were made. From these measurements, a graph such as seen at right was constructed. It depicts the deviations, plus or minus, from the original normal contour

For each technic, the proximal contours at all three positions of the tooth (Fig. 2) were measured. It was generally found that the results were comparable; therefore, only position 1, which is the one taken at the midpoint of the contour, will be used in this report. Tests indicated the maximum error involved in making these measurements was .05 mm. Thus only deviations above this value are considered significant.

RESULTS

Ovoid Type Tooth • The results obtained in the ovoid type tooth with an Ivory no. 1 retainer (Fig. 4) are typical of those obtained with all five mechanical devices. It was evident that with each retainer, when the band was uncontoured and unwedged (merely placed on the tooth and screwed tight), the original contour was not well reproduced. In the area of the greatest convexity (position 3), all but one of the retainers (Sigveland) exhibited a slight amount of undercontouring. The greatest deviation was

in the gingival area. At position 10, which is the cervical margin on this preparation, the overhang, mesiodistally, was 0.8 mm. for one of the retainers (Sigveland). The deviation below position 10 also indicates the amount of overhang present. However, a better indication of the overhang from an occlusocervical direction can be seen in Figure 5 where the values for the various matrixes have been plotted. When the band was not contoured or wedged, the overhang with all retainers was very great. A typical restoration showing the actual overhang can be seen in Figure 6.

When the wedge was used but the band still not contoured, there was a definite improvement with all retainers, particularly in the cervical area. Overhang was reduced to a minimum, as is also evident in the occlusocervical measurements shown in Figure 5. In general, however, undercontouring, as shown by negative values, was still evident at the point of greatest convexity.

If the bands were now contoured but not wedged, the contours still were not comparable to the original, regardless of the retainer used. The only significant difference between these contours and those

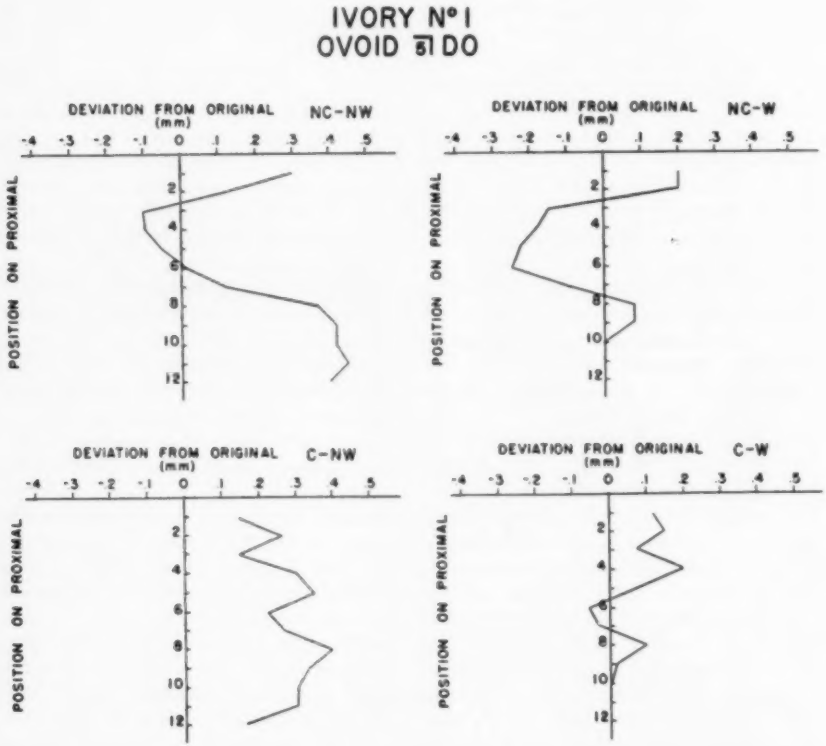

Fig. 4 • Contour reproduction of ovoid tooth with Ivory no. 1 retainer using four different technics. Legend for all graphs: NC-NW = not contoured, not wedged; NC-W = not contoured, wedged; C-NW = contoured, not wedged; C-W = contoured and wedged

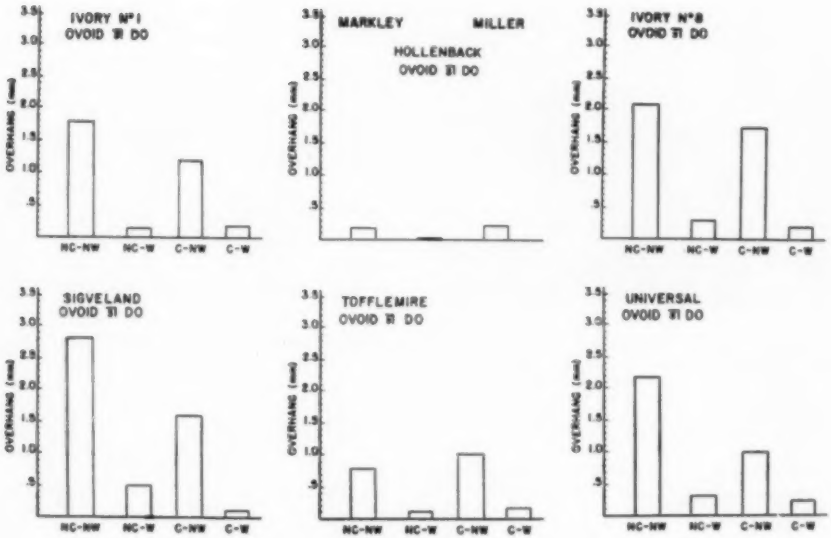

Fig. 5 • Occlusocervical overhang produced by various retainers and technics. Failure to wedge band produced gross overhang, regardless of retainer

where the band had not been contoured was that at the point of greatest convexity there was a tendency toward overcontouring now rather than toward undercontouring. Again the overhangs were great. Best results, however, were attained when the band was contoured and wedged. The reproduced contours were comparable for all retainers, and individual specimens were quite consistent. At the area of greatest convexity there remained a tendency to slight overcontouring with most retainers, but the cervical overhang was minimal.

The actual silhouettes of the contours of restorations placed with the Ivory no. 8 retainer by the four different methods are seen in Figure 7. The influence of contouring and wedging is evident.

When the technics advocated by Miller, Markley and Hollenback were used, the restorations had little cervical overhang (Fig. 5, 8). Probably the only explanation for the presence of any overhang at the cervical seat was the inability of even the careful operator to adapt the band perfectly to irregularities in the tooth. In the area of greatest convexity, however, some overcontouring was produced when the technics of Miller and Markley were used. The Hollenback technic, which makes use of an uncontoured band, caused an undercontoured restoration in this area. This, of course, would be expected on an ovoid type tooth.

Miller[4] has stated that use of an uncontoured band produces a high contact. Examination of the data revealed that failure to contour the band did cause the area of greatest convexity to be raised in an occlusal direction in approximately 55 per cent of the restorations. When the bands were contoured, only 26 of 111 restorations placed showed any shift in position. Thus if it can be assumed that the area of greatest convexity is also generally the contact area, then contouring

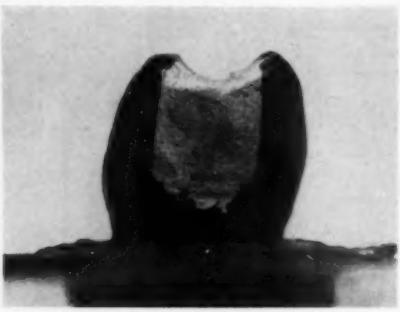

Fig. 6 • Typical overhang resulting from band that was not wedged. (This photograph is typical of those used to measure the values seen in Figure 5)

would seem to be essential for re-establishing proper contact.

Square Type Tooth • One representative series, using the square type tooth and the Universal retainer, is shown (Fig. 9). The overhangs are plotted in Figure 10. Much the same trend was found as with the ovoid type tooth. In general, it can be seen that the contours were somewhat more uniform and when the bands were contoured and wedged, the reproductions closely approached the original contour. It could be anticipated that the deviations would be less with a tooth of this shape than with an ovoid tooth. Contouring generally produced a contour more nearly approaching the original, but it was interesting to note that with three of the mechanical retainers, if the band was contoured but not wedged, the overhang was even greater than when the same band was not contoured (Fig. 10). This probably can be attributed to a tendency to overcontour at the cervical area which resulted in an overhang.

The technics of Miller and Markley produced excellent reproductions (Fig. 11), but the Hollenback technic resulted in considerable undercontouring in the areas of greatest convexity (positions 4, 5 and 6 on this tooth).

Tapering Type Tooth • A distoocclusal preparation on a mandibular first molar was used in the tapering type tooth. Naturally there is only a slight convexity, occlusocervically, on the proximal surface of this type of tooth. It was found that little could be gained by contouring; therefore, only the effect of wedging was studied. A typical result can be seen in Figure 12. All the methods produced contours that were close to the original, the maximum deviation being only .35 mm. Wedging again resulted in a restoration that had minimum overhang (Fig. 13).

DISCUSSION

This study has indicated clearly that, with all three types of teeth, wedging is

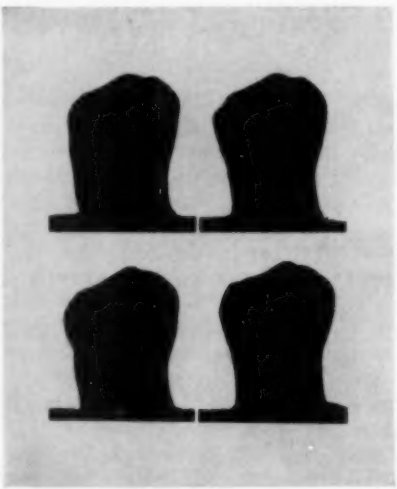

Fig. 7 • Actual silhouettes from a representative series. The restored surface is on left of each silhouette. Upper left is band not contoured or wedged. Upper right shows influence of wedge at cervical but a generally poor contour since the band was not contoured. Upper conturing, lower left, the contour is good but gross cervical overhang is present because of failure to wedge. Lower right, contoured and wedged, produces good contour and little overhang

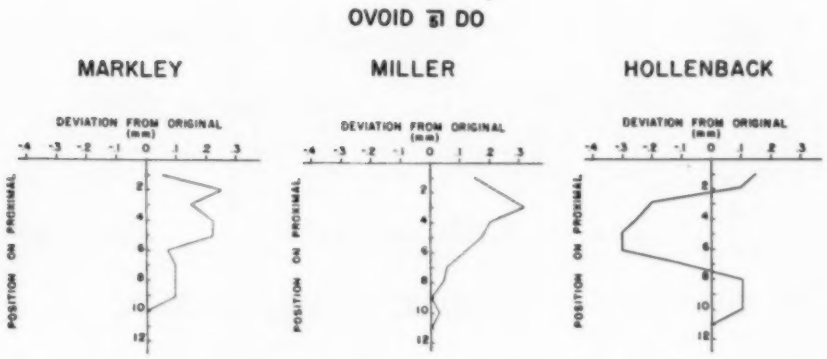

Fig. 8 • Contours as reproduced by technics of Markley, Miller and Hollenback. Overhang is minimal

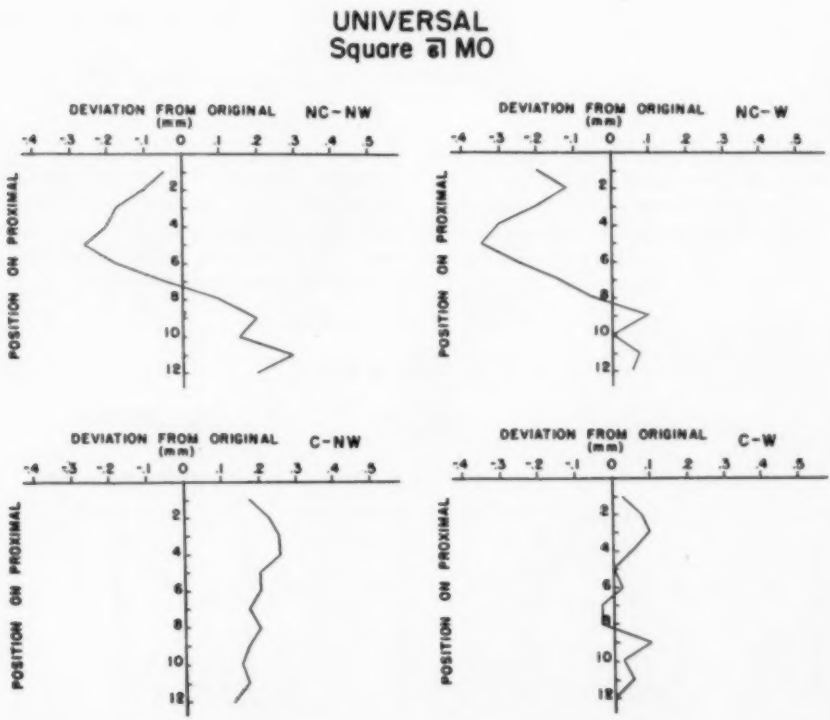

Fig. 9 • Reproduction on square type tooth made with Universal retainer

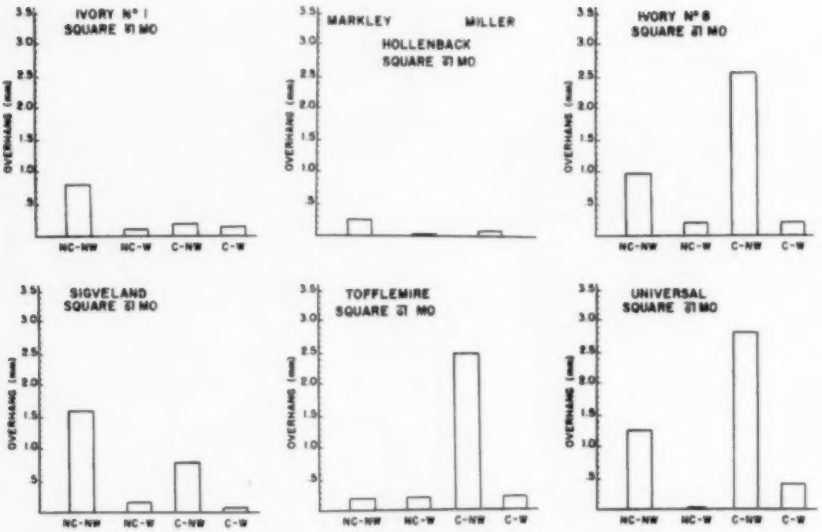

Fig. 10 • Occlusocervical overhang on square type tooth

imperative in order to eliminate cervical flash of amalgam. Likewise, for an accurate reproduction of the proximal contour, contouring of the band is essential for ovoid or square-shaped teeth. It may be argued that the overhang below the cervical margin can be cut off and the amalgam trimmed to proper contour immediately after removal of the band. This idea would seem to be a dangerous one. It is obvious that the human variable is involved, and great proficiency is re-

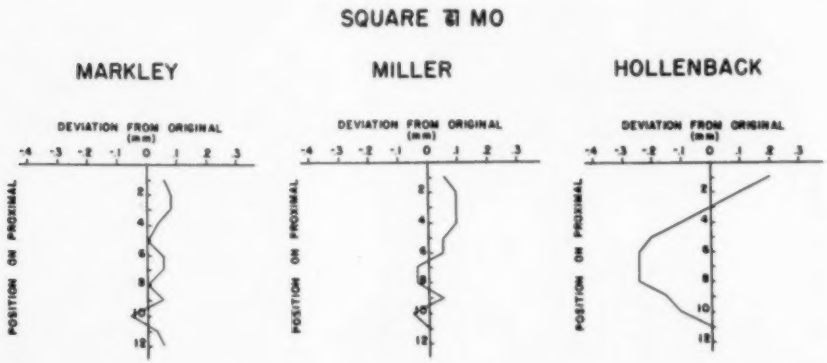

Fig. 11 • Reproduction on square type tooth with individual technics

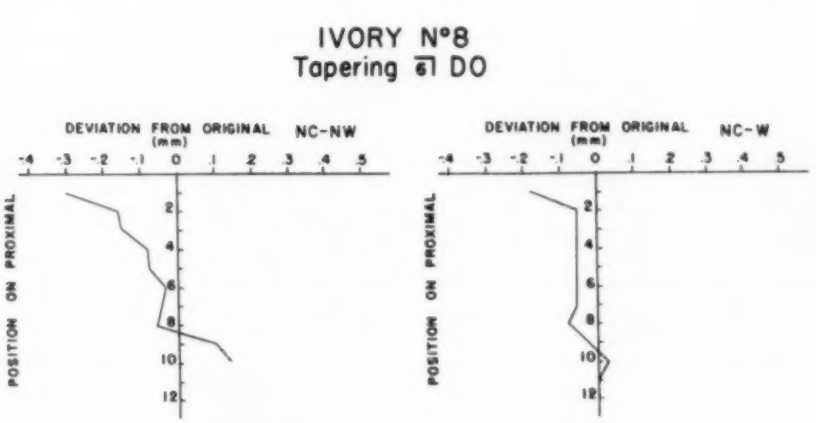

Fig. 12 • Reproduction on tapering tooth with Ivory no. 8 retainer

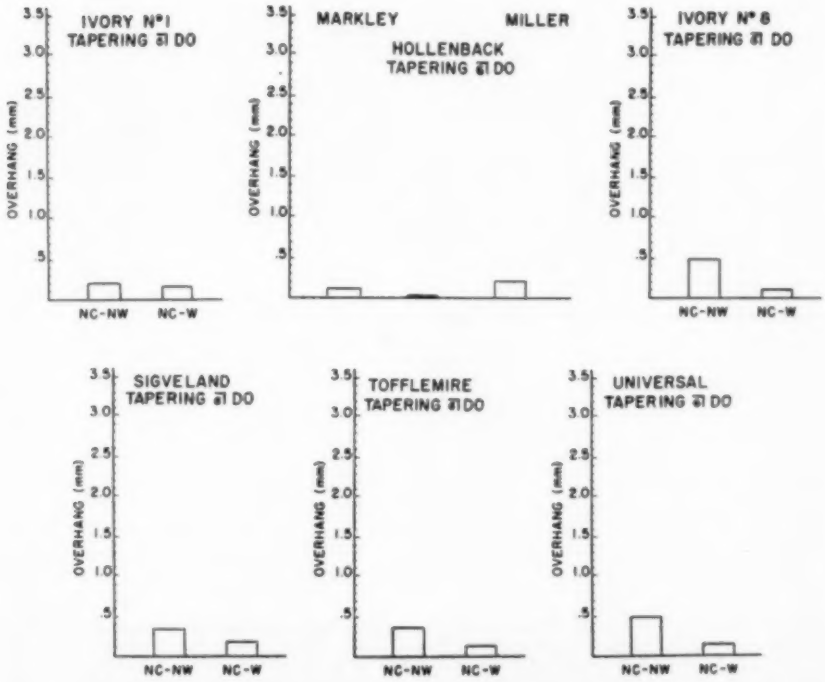

Fig. 13 • Occlusocervical overhang on tapering type tooth

quired on the part of the operator in removing the flash and in restoring proper contour. That it is difficult to carve proper contour is evident if the data shown here are analyzed. For example, with the ovoid tooth, positions 1 and 2 are above the area of greatest convexity and are thus not influenced by the band itself. This area was carved, as in the conventional dental practice, to what was visually an exact reproduction of the original. The graphs show that the contour in this area was not a good reproduction. Thus it would not seem likely that the dentist could routinely carve or trim a restoration in any area to an exact replica of the desired contour.

It is also believed by many[4, 5, 16, 17] that amalgam should not be unduly disturbed during this time. Trimming and carving may produce strain-hardening or draw mercury to that area.[16] Thus the use of a matrix technic which would, as nearly as possible, minimize cervical overhang and restore normal contour would seem necessary for the successful amalgam restoration.

Although for ovoid and square type teeth, both contouring and wedging are essential, wedging is of greater importance than contouring. Best results were obtained by using both. Because of its anatomic shape, however, the contouring appears to be of no benefit to the tapering tooth.

SUMMARY

Eight matrix band technics, including five different mechanical retainers, were evaluated for their effectiveness in restoring the proximal contour of amalgam restorations. The three basic types of teeth, ovoid, square and tapering, were studied.

None of the technics reproduced perfectly the proximal surface. Deviations were slight with all procedures, however, when the bands were carefully contoured and wedged. Regardless of the retainer employed, failure to wedge the band resulted in gross cervical overhang. Contouring alone produced a more normal contour, particularly on the square type tooth, but it did not reduce the amount of overhang.

With the ovoid and square type teeth, the point of greatest convexity had a tendency to be shifted occlusally when the bands were not contoured. Good reproductions of the proximal surfaces on the tapering type tooth were obtained with all technics, even without contouring, when the band was wedged. The ovoid type tooth proved to be the most difficult to reproduce with the mechanical retainers.

16. Keys, D. A. Some effects of methods of treatment on silver amalgam. Fort. Rev. Chicago D. Soc. 27:9 March 15, 1954.

17. Coy, H. D. Personal communication.

Men of Culture • The men of culture are those who have had a passion for diffusing, for making prevail, for carrying from one end of society to the other, the best knowledge, the best ideas of their time: who have labored to divest knowledge of all that was harsh, uncouth, difficult, abstract, professional, exclusive; to humanize it, to make it efficient outside the clique of the cultivated and learned, yet still remaining the best knowledge and thought of the time, and a true source, therefore, of sweetness and light. ***Matthew Arnold.***

Registration of centric and protrusive records for construction of complete dentures

Edwin H. Smith, Jr., D.D.S., M.S.D., Washington, D. C.

Many excellent articles have been published concerning the making of accurate jaw relation records for construction of complete dentures. The accurate registration of a centric jaw relation is, for some edentulous patients, probably the most difficult single procedure encountered during the construction of complete dentures. Each operator modifies and changes the technics he sees, hears or reads of to suit his own special needs and ability. The technic presented here is not original but is a combination and a modification of technics taught by other operators.

For the sake of clarity, definitions of the terms as they are used in this article are given:

Centric relation—The mandibulomaxillary position at any given vertical dimension, when the condyles are in the most distal unstrained position in the glenoid fossae of the temporal bones.

Centric occlusion—The maximum interdigitation of the maxillary and mandibular teeth.

Rest position of the mandible—The involuntary position assumed by the mandible when the resting tonus of the musculature above is exactly balanced by gravity and the resting tonus of the musculature below.

Vertical dimension—Prosthodontically, there are two vertical dimensions of the face. The first, the vertical dimension of rest position, is the height of the lower part of the face when the mandible is in rest position. This position is believed to be more or less constant throughout life and will change only as the muscles are modified.[1] The second, the vertical dimension of occlusion, is the height of the lower part of the face when the teeth are in occlusion, and is the position usually recorded with occlusal rims in complete denture construction. This vertical dimension can easily change by tooth migration, loss or abrasion, and is the one that is modified when opening or closing the bite is performed.

Freeway space—The distance between the maxillary and mandibular teeth when the mandible is in rest position.

BASIC CONSIDERATIONS

Several basic considerations must be discussed in order to understand the principles and beliefs on which this technic is based. All complete dentures, regardless of the occlusal patterns of the teeth, will exhibit lateral displacement of the denture base in function. Consequently, for lateral stabilization, the entire buccal and labial cul-de-sac of the maxilla and mandible not displaced by muscle action

Lieutenant Colonel, Dental Corps, U. S. Army. Chief, prosthetics section, dental service, Walter Reed Army Hospital.

1. Thompson, J. R. Concepts regarding function of the stomatognathic system. J.A.D.A. 48:626 June 1954.

should be included as part of the lateral flange of the denture.

An exact jaw relation record can be made in the mouth and transferred to the articulator, maintaining the same positional relationships between the shellac baseplates and the ridges, only when the baseplates are accurate negative reproductions of the casts. To make and to utilize accurate records of jaw relationships, the bases used in making these records must be carefully and accurately adapted to the casts without engaging any undercuts. A rocking baseplate completely defeats its purpose, as the rocking makes it impossible to determine into which position the baseplate may move when the record is made. Lined baseplates are easily constructed and, if correctly made, adequately satisfy the requirements.

Eccentric jaw relation records should be made to permit the adjustment of the articulator of choice to simulate more closely the movements of the patient's mandible. The setting of these articulator adjustments for each patient allows the development of a more nearly balanced occlusion. Many recognized prosthodontists maintain that lateral balance is unnecessary, or may be undesirable, and that a good centric jaw relation record is all that is necessary.[2,3] The author disagrees, believing that even if lateral balances are unnecessary during mastication, they are essential during the myriad nonmasticatory contacts of the dentition throughout the day.

A brief study of the comparative anatomy of mammals brings to light several interesting relationships between the temporomandibular joint, the associated tooth patterns and the musculature. The occlusion of the teeth, the temporomandibular joint, the musculature and the movements of which this joint is capable are closely related.

The ox, as a representative of the herbivora, has an almost flat posterior plane of occlusion anteroposteriorly, with a reverse Monson curve laterally. The occlusal surfaces of the posterior teeth are crossed by ridges and infundibula, which give the teeth a coarse, ridged chewing surface.[4]

The glenoid fossa in the ox is located on the wide posterior border of the zygomatic process of the temporal bone and has a smooth concave surface anteroposteriorly and laterally. The joint is limited, posteriorly, by the postglenoid process, the anterior surface of which is in articulation with the condyle of the mandible.[5,6]

The angle of the mandible is a smooth curve. The condylar process, elongated transversely with a relatively short neck, lies at a much lower level than the end of the coronoid process.[7,8] Movement of the jaw is chiefly horizontal, and the joint surface is loose and wide. The teeth have spread out and developed laterally to resist transverse movement.[9]

The masseter muscle, the largest of the muscles of mastication in the ungulata, is modified, in origin and insertion, so that the contraction of a single masseter muscle pulls the mandible toward the side of the contraction. The temporal, the external pterygoid and the internal pterygoid muscles have an action similar to that of the musculature in man. The occipitomandibularis muscle, a short fusiform muscle originating at the occipital

2. Jankelson, B.; Hoffman, G. M., and Hendron, J. A. Physiology of the stomatognathic system. J.A.D.A. 46:375 April 1953.

3. Kurth, L. E. Mandibular movement and articulator occlusion. J.A.D.A. 39:37 July 1949.

4. Sisson, S. Anatomy of the domestic animal, ed. 3. Revised by Grossman, J. D. Philadelphia, W. B. Saunders Co., 1938, p. 402-404.

5. Sisson, S. Anatomy of the domestic animal, ed. 3. Revised by Grossman, J. D. Philadelphia, W. B. Saunders Co., 1938, p. 62.

6. Sisson, S. Anatomy of the domestic animal, ed. 3. Revised by Grossman, J. D. Philadelphia, W. B. Saunders Co., 1938, p. 137.

7. Sisson, S. Anatomy of the domestic animal, ed. 3. Revised by Grossman, J. D. Philadelphia, W. B. Saunders Co., 1938, p. 71.

8. Sisson, S. Anatomy of the domestic animal, ed. 3. Revised by Grossman, J. D. Philadelphia, W. B. Saunders Co., 1938, p. 140.

9. Thompson, A. H., and Dewey, M. Comparative dental anatomy, ed. 2. St. Louis, C. V. Mosby Co., 1920, p. 155.

bone and inserting into the angle of the ramus, has no counterpart in man. The muscle acts to open the jaws.[10]

The temporomandibular joint has an articular surface which permits extensive transverse movements.[11] There is a definite correlation among the parts of the stomatognathic system of the ungulata designed to give maximum chewing efficiency to a transverse or laterally gliding chewing cycle. The temporomandibular joint, the neuromusculature and the teeth are interrelated and modified to permit maximum utilization of an almost flat, ridged, posterior occlusion.

The dog, as a representative of the carnivora, has an occlusion in which the upper and lower teeth do not correspond but dovetail into one another. The teeth have sharp edges and pointed projections,[12] the occlusion of which results in an almost completely locked dentition.

The articular surface of the temporal bone, for engagement with the condyle of the mandible, is comprised of a transverse groove which is in continuity with the front of the large postglenoid process.[13] The condyle of the mandible is placed low, is long transversely, much wider medially, and extends over the posterior surface. The coronoid process is extensive and bends backward and outward.[14] The thick, heavy masseter muscle of the dog has an action almost at right angles to the occlusal surfaces of the posterior teeth. The large and heavy temporal muscle has an action entirely concerned with vertical closure. The external pterygoid muscle is not distinct from the internal pterygoid muscle, and their combined action is that of vertical closure. There is no opening, sliding or lateral motion due to independent action of the external pterygoid muscle. The mouth is opened by the action of the paired, strong, round, fleshy occipitomandibularis muscles.[15]

The articular surfaces of the temporomandibular joint of the carnivora are cylindrical. The articulator disk is thin, and anterior gliding or transverse motion is practically impossible.[11]

Again, a relation is found in the stomatognathic system among the posterior dentition, the temporomandibular joint and the neuromusculature. The dentition is locked, the temporomandibular joint permits only a hinge movement, and the neuromusculature is developed to obtain maximum utilization of these relationships.

The stomatognathic system of man is well known to the profession. The relationships among the condyle of the mandible, the glenoid fossa of the temporal bone, the articular disk, the joint capsule and ligaments and the musculature are thoroughly discussed by Shapiro.[16] The associated muscle action and movements are well covered by Boucher.[17] The form of the natural posterior teeth and their relationships are discussed completely by Strang.[18]

The relation among all the parts of the stomatognathic system is further illustrated in the neuromusculature, the temporomandibular joint and the associated posterior tooth patterns and balance as developed in man. There is harmony and lateral balance between the dentition and the other structures of the stomatognathic system.

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11. Sisson, S. Anatomy of the domestic animal, ed. 3. Revised by Grossman, J. D. Philadelphia, W. B. Saunders Co., 1938, p. 274.

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17. Boucher, C. O. Occlusion in prosthodontics. J. Pros. Den. 3:633 Sept. 1953.

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A fundamental premise in Darwin's concept of evolution is that the weakest, the least efficient, and the most poorly adapted members of a species perish, whereas the more efficient and well-adapted members pass their favorable characteristics along to their offspring. A comparison of the stomatognathic system of mammals shows a continuous relation between temporomandibular joint movement and occlusion. This evolutionary constancy among the parts of the stomatognathic system has led to the belief that the neuromuscular relationships of this system will be best served if the replacement for the portion lost from the system—the teeth—restores in as many ways as possible the function of the original member.

To utilize efficiently a flat plane occlusion, man should be endowed with the stomatognathic system of the herbivora. If only the centric jaw relation record is important, then man would have developed the chewing system of the carnivora. But neither of these occlusions harmonizes with the stomatognathic system as developed in man. Thus Schuyler's[19,20] modification of a balanced occlusion with anatomic cusp and sulci, or reverse Monson curve occlusion as modified by Pleasure[21] and balanced by Jordan,[22] should be used. These occlusions allow a harmonious, laterally balanced functional relationship among all parts of the masticatory apparatus.

Balanced occlusion in artificial dentures is possible if eccentric jaw relation records are made in the patient's mouth and the instrument of choice is adjusted to these records.

The instrument used in this technic is the Hanau Model H articulator. This articulator is incapable of accurate adjustment to lateral jaw relation records and is dependent on an arbitrary setting to accommodate Bennett movement. This is one of the drawbacks of the instrument; it may be compensated for by setting the Bennett movement at 20 degrees or more rather than by using the formulas set up by Hanau.[22]

A protrusive jaw relation record is made and utilized to adjust the condylar elements of the articulator. These condylar element adjustments with the incisal guidance determine the cusp and sulci inclines.[20] Consequently, the relative relationship between the condyles and the maxilla of the patient must be maintained between the condylar elements of the articulator and the maxillary cast to minimize geometric errors.

CENTRIC JAW RELATION RECORD

The following steps are recommended to register centric jaw relation records:

1. Well-adapted, reinforced, shellac baseplates are constructed on the maxillary and mandibular casts, and wax rims are added.
2. All undercuts on the master casts are blocked out with baseplate wax, the casts are tin-foiled, and the shellac baseplates are relieved as necessary to permit their proper seating on the casts.
3. An impression is made of the tin-foiled casts in the shellac bases with zinc oxide and eugenol impression paste. The occlusal rims now are an accurate duplication of the casts and will permit the transfer of accurate records from the mouth to the casts.
4. Small adhesive tape triangles are placed on the patient's chin and on the end of his nose.[23] The rest position is located by having the patient close, swallow and relax. The distance between the two

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20. Schuyler, C. H. Full denture service as influenced by our understanding of tooth selection and articulation. J. Pros. Den. 2:730 Nov. 1952.

21. Pleasure, M. A. Prosthetic occlusion—a problem in mechanics. J.A.D.A. & D. Cosmos 24:1303 Aug. 1937.

22. Jordan, L. G. Consultant lecture, intern and resident training program, Walter Reed Army Hospital, Washington, D. C., July 1952.

23. Pleasure, M. A. Correct vertical dimension and freeway space. J.A.D.A. 43:160 Aug. 1951.

adhesive tape triangles is measured with a pair of calipers. The patient is asked to make an M sound. The distance is again measured and checked against the measurement obtained during the swallowing action. The distance between the adhesive tape triangles is noted repeatedly until a series of consistent measurements is obtained. The recording of this distance should be accomplished while the patient is seated comfortably upright in the dental chair. If new dentures are being constructed, the old dentures should be in the patient's mouth at the time. If initial dentures are being constructed nothing should be in the mouth while the rest position is located. The orbicularis oris and the mentalis muscles should be at rest during this procedure, otherwise their action might displace the position of the adhesive triangle on the chin and cause the distance between the triangles to vary.

5. The rest vertical dimension is reduced 4 or 5 mm. in order to arrive at the desired occlusal vertical dimension. A 4 or 5 mm. reduction in the vertical dimension between the nose and chin results in a 2 or 3 mm. freeway space in the bicuspid region. The "average" freeway space is 2 to 3 mm., but the operator must vary this distance according to the needs of the patient. The freeway space should be consistently greater for older persons.

6. The maxillary occlusal rim is placed in the patient's mouth and modified as necessary to establish the desired labial contour and the proper length for the maxillary incisors. The incisal edge of the occlusal rim is made parallel to an imaginary line perpendicular to the sagittal plane of the body. A Fox plane guide is used to establish the posterior occlusal portion of the maxillary occlusal rim parallel to a line from the ala of the nose to the tragus of the ear. The posterior portion of the maxillary rim should be 5 to 8 mm. wide, and approximately over the crest of the mandibular ridge.

7. The mandibular rim is trimmed with a knife or hot spatula to occlude tentatively with the maxillary occlusal rim at the previously determined occlusal vertical dimension. Interferences between the occlusal rims should be avoided, particularly in the region of the maxillary tuberosities and the mandibular retromolar pads. All interferences must be removed, and it will usually be more expedient to remove the interfering extensions from the mandibular occlusal rim.

8. The height of the wax on the mandibular occlusal rim is reduced 3 mm. below the desired occlusal vertical dimension. The 3 mm. space is necessary to provide the room for the making of a modeling compound record of centric jaw relation.

9. The condyles are located and marked. The condylar indicator rods of the face-bow are adjusted so that the readings on each side are the same when the tips of the rods are in slight contact with the skin over the condylar markings. A roll of soft wax is adapted to the face-bow fork, the occlusal rims are placed in the patient's mouth, and the patient is instructed to close on the face-bow fork and the wax. The face-bow is firmly attached to the fork while the tips of the indicator rods are in position over the markings locating the heads of the condyloid process. The face-bow is removed from the patient and adjusted to the articulator. The face-bow fork is supported with wooden triangles to prevent tipping, and the maxillary occlusal rim is positioned so that the incisal edge of the occlusal rim is opposite the groove on the anterior guide pin. The maxillary occlusal rim and the maxillary cast are positioned in the wax, and the maxillary cast, after soaking, is attached to the upper ring of the articulator.

10. The maxillary occlusal rim is removed from the face-bow mounting and returned to the patient's mouth. A 6 mm. triangle of soft modeling compound is added to the mandibular occlusal rim in the molar and bicuspid regions. Adequate

room for this record has been provided in step no. 8. The modeling compound is carefully flamed and tempered, and the occlusal rim is seated in the patient's mouth. The patient is told to close slowly "on the back teeth" and is instructed to stop the closure about 1 mm. before the desired occlusal dimension is reached. During this closure careful note is taken to see that the mandible closes on a smooth arc with no deviation. A closure that deviates from a smooth arc usually indicates a lateral or protrusive record.[24] No pressures are exerted on the occlusal rims or on the mandible to aid the patient in locating the desired unstrained position of the condyles in the glenoid fossa. The modeling compound is cooled with air, and the occlusal rims are carefully removed. The modeling compound is thoroughly chilled and the occlusal rims are separated.

11. The region occupied by the compound on the right and left sides should be about the same. The excess modeling compound is removed from the mandibular occlusal rim. The maxillary rim is replaced in the patient's mouth, the modeling compound on the mandibular occlusal rim is flamed and tempered, and the rim is seated in position. The patient should be instructed to close gently "on the back teeth." Calipers are used to check the previously determined occlusal vertical dimension. The modeling compound is cooled, and the maxillary and mandibular occlusal rims are carefully removed together, then chilled and separated. If the vertical dimension is too great when measured with the calipers, these procedures are repeated until the desired height is obtained. If the occlusal vertical dimension is too small, additional modeling compound is added to both sides of the mandibular rim and these procedures are repeated until the desired vertical dimension is obtained.

12. All modeling compound that is not in contact with the occlusion portion of the maxillary occlusal rim is removed from the mandibular rim. This step prevents the edges of the modeling compound from acting as guides while the centric relation record is checked, and permits accurate viewing of simultaneous lateral contact. It is impossible to determine visually the precise moment of contact of two objects meeting in a depression.

13. The maxillary and mandibular occlusal rims are placed in the mouth. The patient is instructed to close gently, while holding his tongue against the posterior border of the maxillary occlusal rim. When the occlusal rims are in contact, a line is scribed between them in the first molar region. The patient should be instructed to close repeatedly "on the back teeth" and an examination is made of the relationship of the scribed lines. The patient should be instructed to close, swallow and hold the occlusal rims together while the relation of the scribed lines is noted. If the two lines consistently coincide, and if at no time does the line on the mandibular occlusal rim appear distal to the line on the maxillary occlusal rim, the anteroposterior portion of the centric jaw relation record is finished.

14. The centric jaw relation record also has a lateral component. The right and left sides of the occlusal rims must make contact simultaneously. The patient should be instructed to open and close gently, while the contact between the right and left occlusal portions of the maxillary and mandibular occlusal rims is carefully noted. Consistent simultaneous contact denotes an accurate record. Premature contact on either side necessitates the addition of modeling compound to both sides of the mandibular occlusal rim, and the reregistration of the record. When the scribed lines in the region of the first molar consistently coincide and there is simultaneous bilateral occlusal

24. Jordan, L. G. Consultant lecture, intern and resident training program, Walter Reed Army Hospital, Washington, D. C., Aug. 1952.

contact, an acceptable centric jaw relation record has been made.

15. The occlusal rims are placed in the patient's mouth, and the patient is instructed to close gently until contact between the occlusal surfaces of the rims is established. After the relation of the scribed lines is noted, the occlusal rims are locked together with warmed, large copper bands.[23] The bands are chilled, and the occlusal rims are removed from the mouth together. The maxillary occlusal rim is sealed to the maxillary cast mounted in the articulator, the mandibular cast is sealed to the mandibular occlusal rim, and the mandibular cast is attached to the ring on the lower arm of the articulator. The maxillary and mandibular casts are mounted in the instrument in an accurate centric jaw relation. The top of the anterior guide pin must be exactly flush with the top of the upper arm of the articulator to maintain accurately the vertical dimension.

PROTRUSIVE JAW RELATION RECORD

These steps are recommended to register a protrusive jaw relation record:[24]

1. The clocks of the condyle elements of the articulator are set at 25 degrees. The condyle posts are adjusted to a Bennett movement set at 0 degrees.

2. A small notch is cut in the maxillary occlusal rim on the right and left sides in the region of the first molar. These notches act as guides in making the protrusive record and prevent the occlusal rims from sliding over one another during the adjustment of the articulator to the protrusive record.

3. The anterior guide pin is dropped about 3 mm. This space provides sufficient modeling compound to permit modification of the articulator record in the mouth without the loss of vertical dimension. A mark is made on the incisal table a quarter inch behind the centric jaw relation position of the anterior guide (incisal) pin on the table anterior guide. The quarter inch protrusive movement falls within physiological limits of most patients, and permits a more accurate mechanical adjustment of the articulator to the record.

4. A roll of soft modeling compound is added to the entire occlusal surface of the mandibular occlusal rim and the occlusal surface of the maxillary occlusal rim is well covered with petroleum jelly. Both rims are placed on their respective casts in the articulator. The upper arm of the articulator is gently closed until the anterior guide pin strikes the anterior guide table in the position a quarter inch behind its centric jaw relation position. This relationship is held until the compound is cool. If there is no lateral deviation of the anterior guide pin along the middle of the anterior guide table, there will be an equal backward movement of both condyles.

5. Both occlusal rims are removed carefully from the articulator, and the compound record is chilled. The occlusal rims are separated, and the modeling compound record is carefully trimmed on the mandibular rim to the outline of the occlusal surface of the maxillary occlusal rim. The anterior relationship of the occlusal rims and the small locking triangles will be used as guides in the positioning of the patient's mandible into the desired protrusive position.

6. The maxillary occlusal rim is placed in the patient's mouth, the modeling compound on the mandibular occlusal rim is gently flamed and tempered and the rim is seated in the mouth. The patient is told to protrude the mandible and to close slowly. The patient is instructed in the positioning of the mandible until the anterior borders of the occlusal rims coincide, and the small modeling compound triangles seat into the grooves on the maxillary occlusal rim. The patient maintains the mandible in this protrusive relation and gently closes an additional 2 mm. This closure modifies the articulator

record to conform to the slope of the articular eminence of the patient.

7. The occlusal rims are removed carefully from the mouth, thoroughly chilled and separated. All excess modeling compound is removed from the mandibular occlusal rim, and the record is returned to the mouth for rechecking. If simultaneous contact of the entire occlusal portions of both mandibular and maxillary occlusal rims is noted as the patient closes in the protrusive position, an acceptable protrusive jaw relation record has been made.

8. Both condylar elements of the articulator are loosened and freed. The maxillary and mandibular occlusal rims are placed in the articulator. The anterior guide pin is raised and the articulator is closed in protrusion, allowing contact between the occlusal surfaces of the occlusal rims. The condylar elements of the articulator are adjusted until the entire occlusal surface of the maxillary occlusal rim is in contact with the entire occlusal surface of the mandibular occlusal rim. The condylar slopes of the articulator are thus adjusted to the movement of the condyles of the patient when the record was made.

SUMMARY

A bilaterally balanced occlusion must be developed in complete dentures, adapting the dentures and their occlusion to the stomatognathic system of man.

Accurate records of jaw relation can be transferred from the patient to the articulator only with accurately constructed occlusal rims.

A face-bow mounting of the maxillary cast is necessary for the Model H Hanau articulator to minimize the geometric error of this partly adjustable instrument.

A modeling compound record of a centric jaw relation can be accurately checked in the mouth for correct anteroposterior and lateral relation and transferred to the articulator without distortion.

A modeling compound protrusive jaw relation record also can be accurately checked in the mouth and the instrument adjusted to the record without distortion.

America's Responsibility • The new policy of the United States is a constructive one—to build through the free world the conditions not only of peace but of good life. The responsibility that rests upon us to lead, inspire and aid free men and free nations is heavier than any that has ever rested upon any nation. It is also the greatest challenge ever offered to any nation to save its own life and its own soul. *Joseph M. Jones, The Fifteen Weeks.*

The use of disinfectants and antibiotics in endodontic practice

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The word "antibiotic" has become such a magical term that there is a mistaken impression among some dentists that antibiotics are not chemical substances. True enough, antibiotics are not manufactured in the ordinary sense of the word; that is, they are not derived from coal tar or wood distillate nor are they prepared synthetically, with one exception. They are manufactured by microorganisms, but the end product is a chemical substance, nevertheless.

A disinfectant and an antibiotic are both chemical agents. The difference is —and it is an important difference—that the antibiotic is effective against microorganisms even in minute concentration, and also that it is generally nontoxic to man when used parenterally in relatively high concentration. Unlike many disinfectants which are protoplasm poisons, antibiotics do not injure tissue cells. Antibiotics are praiseworthy agents for combating infection but they are no panacea.

Antibiotics should be given their due, but they should not be invested with qualities and characteristics they do not possess. For example, it has been stated that repair of periapical tissue is more rapid when an antibiotic is used. This statement is open to question because the only function of the antibiotic when used in the root canal is to eliminate the microorganisms. Once this has been accomplished, repair is effected by the defensive or reparative cells of the body. In other words, it makes no difference whether the microorganisms in the canal are destroyed by a disinfectant or an antibiotic. So long as the defensive mechanism of the body is not interfered with, repair will occur equally as rapidly, or as well, regardless of whether the canal was sterilized by a disinfectant or an antibiotic.

Also, too much dependence must not be placed on antibiotics while removal of the debris from the root canal is neglected. Thorough evacuation of the canal contents and adequate removal of the infected dentin along the canal wall by means of root canal instruments is an indispensable phase of endodontic treatment which cannot be compensated for by antibiotics. Just as in general surgery necrotic debris is removed before an antiseptic or antibiotic dressing is applied, so must all the necrotic material from the root canal be removed first. After instrumentation, the canal should be irrigated to wash out bits of debris that have escaped removal by instruments.

What disinfectant or antibiotic should be used for sterilization of the root canal? Root canal infection is often a mixed infection in which three types of microorganisms may be involved: gram-positive, gram-negative and yeast organisms. The predominating organism of each type respectively is *Streptococcus viridans*

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(alpha), *Escherichia coli,* and *Candida albicans.* Disinfectants are not specific in their action and most root canal disinfectants will destroy all three kinds of microorganisms. Antibiotics, however, have a more specific effect against certain microorganisms, some being effective only against gram-positive, others against gram-negative, and a few against both. As yet there is no commercially available antibiotic effective against yeasts except for internal use.

The antibiotics shall be reviewed briefly in order to evaluate their properties and decide which would be most useful for endodontic practice.

ANTIBIOTICS

Penicillin is still the "king" of antibiotics because it is in many respects the most effective against gram-positive organisms and is still the least toxic of all antibiotics. A few gram-positive organisms, notably the enterococci, are resistant to the action of penicillin. *Streptococcus fecalis, Streptococcus zymogenes and Streptococcus liquefaciens* are examples of enterococci which have been isolated from root canals.

Streptomycin may be considered the "queen" of antibiotics. It is effective against all varieties of gram-negative microorganisms which might be recovered from an infected root canal. In combination with penicillin, a synergistic effect is obtained which is greater than the additive effect of these two antibiotics.

Bacitracin supplements the effectiveness of penicillin insofar as penicillin-resistant organisms are concerned. It is effective against enterococci and other resistant strains of gram-positive organisms which penicillin cannot destroy. In combination with penicillin, a synergistic effect is obtained.

Chloramphenicol chlortetracycline (Aureomycin), oxytetracycline (Terramycin), and tetracycline may be grouped together because their antibacterial spectrum is similar. They are often referred to as "broad spectrum antibiotics." These antibiotics are effective against both gram-positive and gram-negative organisms, rickettsias and large viruses. Their effect, however, is bacteriostatic rather than bactericidal. When combined with penicillin an antagonistic (rather than a synergistic) effect results.

Polymyxin is effective only against gram-negative organisms and is particularly useful against proteus and pseudomonas infections, but these organisms are rarely found in root canals.

Neomycin has an antibacterial spectrum which is somewhat similar to streptomycin, but it is also effective against a few gram-positive organisms and against proteus and pseudomonas infections. Neomycin is not readily absorbed, therefore, it is particularly useful for topical application.

Carbomycin and erythromycin have a similar antibiotic spectrum which approximates that of the broad spectrum antibiotics. They are used primarily against gram-positive microorganisms and are effective against enterococci.

Tyrothricin and subtilin are both polypeptides, both surface tension depressants, and both have the same antibacterial spectrum, being effective against gram-positive organisms. In addition, subtilin is effective against a few yeasts and fungi.

All of these antibiotics have been tried either alone or in various combinations. The most effective combination is one consisting of penicillin, bacitracin and streptomycin. They will destroy gram-positive, penicillin-resistant, and gram-negative organisms respectively. To this caprylate sodium was added in order to destroy yeast organisms, since no effective fungicidal antibiotic is available commercially which is suitable for dental use. This polyantibiotic mixture[1] is suspended in a bland, nonirritating, water-resistant

1. Grossman, L. I. Polyantibiotic treatment of pulpless teeth. J.A.D.A. 43:265 Sept. 1951.

vehicle, namely, silicone fluid (DC 200). This makes a paste which is soluble in periapical exudate and tissue fluids. When kept in a glass-stoppered bottle, the paste is stable for six months at room temperature under ordinary conditions of office use. If it is prepared under ideal conditions of manufacture, during which moisture is excluded, and packed in carpule form so as to prevent access of moisture, the paste is stable for 18 months at room temperature.

ADVANTAGES OF ANTIBIOTICS

The advantage that such an antibiotic combination has over the older root canal disinfectants is as follows. The polyantibiotic mixture sterilizes the root canal in fewer treatments; actually, in about one third the number of treatments as compared to the usual root canal disinfectants.[1] It does this and nothing more, as repair of the periapical tissue is not influenced in any way whether a disinfectant or antibiotic is used. Economically and in every other way, this reduction in the number of treatments is a distinct advantage to both patient and dentist.

If an acute alveolar abscess is present, with considerable edema and perhaps a rise in temperature, drainage should be established and an antibiotic administered systemically. The antibiotic of choice is usually penicillin—either procaine penicillin or dibenzyl penicillin—300,000 to 600,000 units injected into the deltoid muscle. When the symptoms are not so severe, 250 mg. of one of the broad spectrum antibiotics such as tetracycline may be prescribed to be taken every six hours, the initial dose being 500 mg., preferably taken with milk to prevent a gastrointestinal reaction.

Two questions are often asked about the use of an antibiotic in a root canal: (1) Can the polyantibiotic be used safely in a person known to be allergic to one of the antibiotics contained in the formula? (2) Is there any danger of the microorganisms in the root canal becoming resistant to the action of the antibiotics?

SENSITIVITY TO ANTIBIOTICS

It has been estimated that from 2.5 to 5 per cent of the population is sensitive to penicillin, fewer are sensitive to streptomycin, and fewer still are sensitive to bacitracin. Although I have used penicillin for sterilization of root canals since 1944, and the polyantibiotic paste since a few years afterward, I have observed only one instance in which the antibiotics may have caused an allergic reaction. The patient, a girl of 16, gave a history of allergy to foods and pollens but had not previously had penicillin. In this instance two upper central incisors with large root canals and large apical foramens were under treatment. The root canals had been rather liberally filled with the polyantibiotic paste. Two days later the patient had symptoms of itching and urticarial manifestations on the arms and legs.

Tripelennamine hydrochloride tablets (50 mg.) were prescribed, one tablet every four hours, and in 24 hours the symptoms disappeared. Of course, in an allergic patient, it is always a question whether the reaction was really due to the antibiotic or perhaps due to a food or other allergen. If it was due to the antibiotic, it is likely that the polyantibiotic paste had been either forced through the apical foramen during sealing of the canal or had diffused through the foramen, thus gaining entrance to the blood circulation and setting up a generalized reaction.

With this one exception, the antibiotics have not been observed to cause an allergic reaction in many hundreds of cases treated personally and in our school clinic. A possible explanation of this is that (1) antibiotics used in the root canal are generally confined within the canal itself and do not reach the periapical tissue where they could be transported by the blood

circulation; (2) the amount of antibiotic ordinarily used in a root canal is initially small and the amount that could reach the periapical tissue is still smaller, so that only an infinitesimal amount would ordinarily be absorbed into the circulation —perhaps not enough to cause a reaction.

RESISTANCE TO ANTIBIOTICS

The question as to whether microorganisms become resistant to the use of antibiotics in a root canal can be answered in the negative. Ostrander and Crowley[2] found no evidence of bacterial resistance when penicillin alone was used for root canal sterilization. We have observed no evidence of resistance to treatment during the decade that we have used penicillin alone or in combination with other antibiotics. "Rotation of medication," introduced by the author,[3] has been practiced routinely by many dentists using disinfectants to prevent acquired bacterial resistance. Rotation of antibiotics has also been advocated instead of polyantibiotic treatment. Rotation of antibiotics would not be as destructive to microorganisms as the simultaneous use of two or more antibiotics. Furthermore, rotation of antibiotics might even reduce effectiveness, depending on the order in which the antibiotics were used. For example, it has been shown experimentally that "unfavorable results are obtained when penicillin is given first and then is followed a few hours later by streptomycin."[4] On the other hand, if penicillin and streptomycin are given simultaneously, or even if penicillin is preceded by streptomycin, no such unfavorable results follow.

The fact is well known that staphylococci and particularly *Micrococcuspyogenes* var. *aureus* have become increasingly resistant to penicillin and some other antibiotics. I have observed no evidence, however, of acquired bacterial resistance to the use of the polyantibiotic paste in the root canal. This is probably due to the fact that in the high concentration used in the root canal, the microorganisms are overwhelmed and do not have an opportunity of becoming resistant.

ROOT CANAL DISINFECTANTS

Although antibiotics may be used in any type of endodontic treatment, a root canal disinfectant should suffice when a vital pulp is removed. In such instances the infection is not so severe; in fact, infection is generally present only in the region of the pulp exposure, the rest of the pulp being normal and uninfected. A disinfectant, therefore, should be sufficient to control the mild degree of infection present. In such cases the polyantibiotic paste would have no special advantage over the disinfectant. However, the polyantibiotic paste may be used in all instances of endodontic treatment regardless of whether a vital pulp is removed or the root canal is severely infected.

Finally, it should be pointed out that neither a root canal disinfectant nor the polyantibiotic paste need be, nor should be, forced through the apical foramen. In the minds of some, the area of rarefaction at the root apex is identified with microorganisms and infection at the root apex. This is not the case. The focus of infection is in the root canal, and microorganisms only occasionally reach the periapical tissue from the root canal. Here they are challenged and destroyed by the polymorphonuclear cells, setting up a chronic infection as is evidenced by pus being discharged through a fistula in some instances. Or else, the microorganisms destroy the polymorphonuclear leukocytes, and an acute infection results. The point is that microorganisms cannot long survive in living periapical tissue but re-

2. Ostrander, F. D., and Crowley, M. C. Effectiveness of clinical treatment of pulp-involved teeth as determined by bacteriological methods. J. Endodontia 3:6 Jan. 1948.

3. Grossman, L. I. Root canal therapy, ed. 2. Philadelphia, Lea & Febiger, 1946, p. 237.

4. Pratt, R., and Dufrenoy, J. Antibiotics, ed. 2. Philadelphia, J. B. Lippincott Co., 1953, p. 225.

main in the root canal. It is useless, therefore, to force a disinfectant or antibiotic through the apical foramen. At its worst it may destroy tissue including the polymorphonuclear cells; at best, it may set up an irritation. Neither is desirable, nor is it good practice. The principal object of endodontic treatment is sterilization of the root canal, followed by canal obturation. When this is attained, a fistula, if present, will heal completely, and destroyed periapical bone will become repaired if the damage to the periapical bone is not too great.

SUMMARY

1. Repair of periapical tissue will occur regardless of whether a disinfectant or an antibiotic is used for sterilization of a root canal.

2. Thorough cleansing of the root canal is extremely important.

3. Root canal infection is often a mixed infection in which three types of microorganisms may be involved—gram-positive, gram-negative and yeast organisms. Most root canal disinfectants will destroy all three types; however, antibiotics have a more specific effect, some being effective against gram-positive organisms, some against gram-negative, and a few against both. As yet there is no commercially available antibiotic effective against yeasts.

4. The various antibiotics have been tried, either alone or in combination, in endodontic treatment. The most effective combination is one consisting of penicillin, bacitracin and streptomycin to which caprylate sodium is added.

5. With only one exception, no allergic reaction to the antibiotics has been observed in many hundreds of cases treated. The explanation for this is possibly that the antibiotics used in the root canal generally are confined to the canal itself, and the amount of antibiotic used is initially small.

6. No evidence has been observed of acquired bacterial resistance to the use of the polyantibiotic mixture in the root canal.

7. Disinfectants may be used for pulpectomies, but polyantibiotic mixtures are more effective when severe infection of the root canal is present.

8. Neither a disinfectant nor a polyantibiotic paste should be carried through the apical foramen into the periapical tissue.

Scientific Methods • The true scientist considers his theories not as perfect and permanent, but as essentially incomplete and precarious; he is ever ready to abandon any part or the whole of them, should new experimental facts make it necessary. There are scientific methods; there are no scientific dogmas; there is no scientific orthodoxy. *George Sarton, Introduction to the History of Science.*

The production of multiple indirect restorations with agar hydrocolloidal impression material

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Progress in scientific dentistry has been augmented greatly by the hydrocolloid indirect technic. Its use has been acclaimed by many dentists as an innovation comparable in importance to nitrous oxide, procaine and the rotating diamond instruments. Excellent results have been obtained by experienced operators using a standardized procedure. Because of the accuracy of models made from hydrocolloid impressions, the dentist is able to delegate the construction of indirect restorations to the auxiliary staff; he then can spend additional hours at the chair to care for more patients.

Dentists have obtained gratifying results by using the hydrocolloid technic. To determine the attitude of these operators and the merits of the procedure, a questionnaire was mailed to over 1,000 dentists known to be using the hydrocolloid indirect technic. Some 895 returns to the questionnaire[1] revealed that 88 per cent of the dentists surveyed found that the practice of dentistry required less physical effort if the hydrocolloid technic was used; 89 per cent indicated that their dentistry had improved, whereas 95 per cent stated that dentistry was easier—three significant attestations.

Although many admit exceptional results with the use of the hydrocolloid technic, they do not apply the technic to multiple restorations to its fullest extent and value. With time and education, a broader acceptance and usage will be forthcoming. Like many procedures in dentistry, extended operations become simpler once the operator masters the technic.

EXPOSING THE CAVITY MARGIN

Probably the most troublesome phase of the technic for all persons is the retraction of gingival tissue. Without adequate exposure of the cavity margins,[2] the procedure fails. There are conservative and radical retraction methods. The conservative method may involve any procedure which does not cause sloughing or loss of tissue. It is a method which may traumatize, yet healing will take place within 24 hours. The radical method involves the destruction or removal of tissue for exposal of the cavity margin by means of the knife, electrical instruments or chemical agents.

Though space does not permit a full discussion of various materials and technics used for retraction, a conservative procedure and its applications will be discussed, and radical methods of removing tissue adjacent to the cavity margin will be reviewed.

Instructor in operative dentistry, School of Dentistry, University of Southern California Los Angeles.

1. Thompson, M. J. Standardized indirect technic for reversible hydrocolloid. J.A.D.A. 46:1 Jan. 1953.

2. Thompson, M. J. Exposing the cavity margin for hydrocolloid impressions. J. South. Carolina D. A. 19:17 Feb. 1951.

CONSERVATIVE RETRACTION

Anterior Crowns • The preparation is made in the usual manner, beyond the gingival crest into the crevice. Extending the margin to conceal the cement line when the jacket is seated presents a problem in labial retraction because the shoulder has to be extended much farther on the labial side than in other areas surrounding the tooth. Retraction without loss of tissue can be handled, technically, as follows:

1. Several short strands of cotton fibers which are impregnated with alum crystals (prepared by immersing cotton cord in a saturated solution of alum, then allowing the cord to dry) are tucked into the crevice with a no. 3 explorer, compressing the fibers to the bottom and extending them as one continuous strand to surround the tooth. The dry crystals will absorb the seepage and, through the styptic action of the chemical, seal off the capillaries.

2. Relaxation of the tissue is accomplished by applying one or two drops of epinephrine solution to these compressed fibers, allowing the solution to fill the crevice surrounding the tooth. The moist alum-bearing fibers function as a wick, carrying the liquid, a vasoconstrictor, to the very depth of the crevice; by absorption through the tender, thin epithelial walls of the crevice, the solution is carried to the connective tissue. The time required for full action of this drug will depend to a great extent on the health of the tissue. The effectiveness of the epinephrine will be indicated by the extent and color of the blanched tissue. An extent of a half inch or more of blanching is not uncommon. The extent of the blanching will somewhat determine the working period for further retraction.

3. The wet fibers are removed, and the relaxed tissue is washed free from chemicals. The region is isolated with cotton rolls and the crevice desiccated with blasts of air.

4. To displace the relaxed tissue and open the crevice completely before taking the impression, short lengths of sterile cord or thread are tucked into the crevice to its full depth and to a level clearing the margin. This cord may be ordinary sewing thread, available in a variety of gauges, or special glazed thread having a hard texture, such as button thread. It is well to use two or three short lengths, one slightly overlapping another, but each terminating in a region having a depth such as found in the interproximal and the lingual surfaces but not on the labial surface where the crevice is shallow.

The impression is made while the crevice is open and the threads are in place. The wide, open crevice permits a bulk of hydrocolloid to extend into the crevice, minimizing the chance of a fracture of the impression on removal.

Posterior Crowns • Conservative retraction of gingival tissue may be made around posterior preparations with the same technic used for anterior crowns. Inasmuch as tissue in the area of a decayed tooth generally is inflamed and requires treatment, a modified conservative retraction with only slight loss of diseased tissue may be carried out with benefit to the gingiva. In this instance, retraction can be handled using cotton cord impregnated with zinc chloride (the cord is soaked in a solution of 8 per cent zinc chloride and allowed to dry).

Short strands of this stronger chemical-bearing cord are used to fill the crevice surrounding the tooth. They are tucked into place one by one and left for five minutes. This period will vary depending on the amount of seepage present for redissolving the zinc chloride crystals. The wet strands are removed and surface chemicals washed away with a syringe of water. Again the region is isolated with cotton rolls and the tooth and tissue dried with blasts of compressed air. The dry crevice is filled with short lengths of

sterile, unmedicated thread, tucked into place beyond the margin of the cavity and the impression taken while the threads are in position.

Three-Quarter Crowns • Conservative retraction for a three-quarter crown preparation is performed as described previously, using alum fibers and epinephrine. Then, as an effective substitute for short lengths of thread, a long thread bearing a loop is employed to open the crevice. The loop is formed in the center of the thread with a single knot. It is placed over the preparation and tucked into the crevice. The knot is pulled together, and a drop of warm wax is added to hold the loop taut around the tooth yet allow it to yield so that the thread may be pressed into the crevice. The impression is taken while this thread is in place.

RADICAL RETRACTION

Anterior Crowns • Radical exposure of margins for anterior preparations becomes necessary when there is insufficient tooth projecting above the gingival margin for the retention of a crown. In some instances of this kind, resulting from fractures or decay, it may be necessary to remove bone to provide adequate retention. Incision with a surgical knife is the method of choice for removal of soft tissue. It results in clean cuts without traumatizing the underlying tissue and leads to more rapid healing. The bleeding is stopped with one of the electrical instruments, Monsel's solution (ferric subsulfate solution) or with zinc chloride (40 per cent) impregnated cotton fibers. After a dry field is secured, the impression is taken.

Before the patient is dismissed, the tissue in the operative site should be treated with an aqueous solution of nitromersol or a comparable mild antiseptic, and the tissue and tooth should be covered with eugenol cement. The region should remain protected in this way for three or four days to allow the damaged tissue to heal and new tissue to develop.

Posterior Crowns • Radical procedures are justified when it is expedient and necessary to obtain complete exposure of the margin. In many instances such a procedure is followed around molars and bicuspids, especially where there is prolific decay and when the health of the surrounding tissue can be improved. The tissue is removed, when necessary, to the alveolar bone with periodontal incising instruments. After the bleeding and seepage have been stopped and the region has been dried, the impression is made.

The removal of tissue provides an advantage other than clearing the margin for an impression. The preparation may be extended without visual obstruction and finished to receive the marginal fit of a well-sculptured anatomical crown. The junction, when made to seal, should not irritate the soft tissue. The gingiva should be permitted to regenerate and form a normal contour for its own protection and the prevention of dental decay.

The use of cotton strands impregnated with a 40 per cent solution of zinc chloride should be considered in the category of a radical approach to exposing the cavity margin. Impregnated strands can be used, however, with a minimum loss to the epithelial tissue if applied for only one or two minutes. When they are applied for extended periods, and are packed tightly into the crevice with little moisture for redissolving the crystals, sloughing will occur. The depth and extent of sloughing will depend entirely on the penetration of the chemical. Usage around posterior preparations for short periods is acceptable and provides results immediately in most instances without the necessity of more radical procedures.

Interfering tissue around simpler preparations such as Class II, III, IV and V

cavities is removed surgically when necessary in order to secure a good impression.

CARE OF THE PREPARED TOOTH

At the conclusion of the operative session, the exposed dentin and traumatized soft tissue should be treated and protected from the fluids of the mouth. The tissue and cavity should be isolated and dried, a mild antiseptic applied and the entire region covered with a eugenol cement pack. By providing such a protective covering routinely, a great deal of postoperative discomfort for the patient can be averted. This medicated pack is soothing to the soft tissue and comforting to the tooth. Eugenol cement has proved to be an excellent temporary filling material; it seals well and is nonirritating to the pulp.

When the soft tissue flares up from an infection after the seating of a restoration, special treatment is required. Satisfactory results can be obtained if the teeth adjacent to the inflamed tissue are cleaned to remove bacterial plaque and food, and chromic acid (10 per cent) or the medicament of choice is applied. The region is isolated and desiccated to as great a degree as possible before application of the treatment. The caustic action of the acid is nullified immediately by spraying the region with a solution of hydrogen peroxide. The tissue is protected with a eugenol cement pack locked between and around the teeth and left for several days. The treatment period may be of long or short duration, depending on the necessity.

MULTIPLE RESTORATIONS

Success in the production of accurately fitting multiple restorations, whether for single gold castings or for fixed or removable replacements, depends on the operator's adherence to certain essentials.

The package or syringe of hydrocolloid should be placed in a water bath held at 212°F. for ten minutes. For practical purposes, it should be stored for ready use throughout the working day at a temperature not lower than 145°F.

Before taking the impression, further conditioning and reduction of temperature of the tray of material are essential, for two reasons: (1) to increase the body of the material to provide sharper impressions of the margins and submarginal area in the gingival crevice and (2) to ensure the comfort of the patient.

THE IMPRESSION

Accurate impressions may be made of cavities and critical regions if the material in the tray is free from a water-soaked surface, from exudation from the package, extending throughout the material, or from lumps or a crusty surface, resulting from prolonged exposure or cooling in the air as a tempering process. Imperfections in the impression may be avoided if the cavity is free from blood and grindings, if the tissue and crevice are dry, and if uncontaminated material is used in the tray and fresh hydrocolloid, free from water, is injected from the syringe into the cavity.

In the production of multiple restorations, several impressions are required. A complete impression is made of each arch, and a sufficient number of small impressions is made to supply dies for each preparation. The complete impressions are poured with stone only once when bridges and precision partial dentures are to be constructed.

THREE-QUARTER CROWN CAVITY

In making an impression for a three-quarter crown cavity, the impression tray, whether small or large, should be sufficiently large to extend beyond the critical teeth to accommodate a bulk of hydrocolloid material. The quantity per-

mits this elastic material to stretch more freely and pull by the undercuts with less chance of fracture or distortion.

Unilateral trays should be supported at each end with a roll of wax or compound, providing a seat for stabilizing the tray against the teeth with hand pressure during the chilling process.

The tray should be filled with smooth-flowing, nongranular material from a dispensing syringe, then placed in the tempering bath for final conditioning. During this tempering period, the margins of the cavity are perfected, and the tissue is displaced for exposing all margins.

Just before the impression is taken, the surface of the tray material is scraped away by the dental assistant to a depth of about ⅛ inch, to remove surface contamination from the water bath. The water-cooling rubber tubing is attached, and the tray is held ready for the operator. Simultaneously, the operator removes the small syringe from the storage bath, wipes the needle and barrel free from water, then extrudes a portion of hydrocolloid material from the needle in a region away from the tooth. With the material flowing, the point of the needle is moved into the cavity, preferably on the gingival floor. With a continuous flow, the cavity is filled and all margins covered. Immediately the tray of material is placed over the ejected material, pushed into place and held securely until the material is congealed thoroughly by drawing water through the tubing of the tray.

Removal of the impression is accomplished by placing the fingers on the hydrocolloid material extending beyond the metal tray and pressing firmly, displacing it without hesitation.[3]

After the impression is washed with running water to remove saliva and small loose particles, it is immersed in a 2 per cent solution of potassium sulfate, the stone is mixed and the impression is poured immediately. For the single crown, the impression containing the prepared tooth may be poured twice. The first pour provides the single working die, and the second may be used for articulation and adjusting the contact points.

CENTRIC OCCLUSION

Centric occlusion which will permit the fabrication of crowns and bridges requiring a minimum of adjustment in the mouth is obtained when feasible by mounting the casts of the complete arch without a wax bite. There should be a sufficient number of teeth with worn facets located strategically for proper indexing.

When a wax bite is made, a wax sheet the full width of the dental arch proves most satisfactory for either unilateral or complete restorations. With bilateral resistance, a patient is more likely to bite evenly and to a complete centric closure without terminating off-center on the slope of the cusps. Registration of centric occlusion and the eccentric positions associated with full mouth rehabilitation will be discussed later.

THE FIXED BRIDGE

Replacement of teeth by means of a bridge may be accomplished completely by the hydrocolloid indirect technic with the same expectation of an accurate fit as in the restoration of a single complex crown. It is necessary, however, to respect the limitations of the impression material and stone models[4] and to assemble the bridge without distortion.

All troublesome or questionable steps in the construction of an accurately fitting bridge can be avoided by following two distinct and dependable procedures: First, the model should be poured solid,

3. Paffenberger, G. C. Hydrocolloidal impression materials: physical properties and a specification. J.A.D.A. 27:373 March 1940.

4. Phillips, R. W. Factors affecting the surface of stone dies poured in hydrocolloid impressions. J. Pros. Den. 2:390 May 1952.

and secondly, the bridge should be assembled by casting.

The construction of restorations from models with removable dies or split models of various indexing designs has been done successfully by skilled operators since the innovation of the hydrocolloid technic.[5] Bridges fail to fit at times, however, and must be rebuilt. Some dentists have complained that the bridge has to be placed in the mouth at least 24 hours without cementation to allow the teeth to move, relieving the tightness and allowing a complete seating of the bridge.

A model with removable dies whose accuracy approaches that of the solid model is made by pouring the impression to a distance beyond the prepared teeth. In the pouring process, while the stone is soft, tapered and keyed dowel pins are inserted in the mixture over the abutment teeth, and, in addition, one or two loops of wire (approximately 18 gauge) are immersed partially in the stone in the area of the edentulous space to establish a bond between this portion of the model and the second pour. To facilitate a straight removal, the dowel pins are placed vertically, with a paralleling instrument.[6] This procedure is an improvement in the use of the pins. After this stone has hardened and a separating solution has been applied, the remaining portion of the impression is poured. After its removal from the hydrocolloid impression, the model is slit with a plaster saw on each side of the prepared abutments; the edentulous space remains.

The error anticipated from allowing the impression to remain in solution or in a humidor for an hour while the initial pour is hardening can be discounted because the span for the bridge is preserved by the solid model. The discrepancy, should one occur, will be found in the inaccuracy of reseating the individual dies when constructing the bridge.

Cast Assembled Bridge • Since 1940, I have assembled the fixed bridge by casting the gold pontic around gold bars extending from each abutment and overlapping in the edentulous space (illustration). Although the joint is quite rigid, solder is used to give it additional strength and to allow for polishing a smooth surface. Shrinkage in casting the pontic is compensated for by using the same technic employed for the cast gold inlay.

This procedure has been followed routinely, with few exceptions, for years; it permits the completion of the bridge ready for cementation at the time of the patient's second visit. The procedure includes the placement of the esthetic facing. Only minor occlusal and contact adjustments are required before seating.

Easier and Better Bridges • Form and function can be restored to simulate nature with less physical effort through the indirect technic. Sculpturing of the abutments is done at the bench with accurate models, replicas of the condition in the mouth, with complete control and accessibility of all areas and without visual or mechanical obstruction. Abutments which are badly mutilated, requiring a preparation extended beyond the cementoenamel junction on the root, can be restored for efficient masticatory function and contoured for the protection of the gingival tissue surrounding the teeth. Normally, the interproximal space is filled with soft tissue, but with tooth disintegration the papilla disappears, leaving an area for food impaction and leaving the crest of the receding gingiva without protection.

The indirect technic permits contouring the interproximal surface for a properly located contact point with a convexity directed gingivally, buccally and lingually to shed food. The wax form for

5. Sears, A. W. Hydrocolloid impression technique for inlays and fixed bridges. D. Digest 43:230, 1937.

6. Mann, A. W. Critical appraisal of the hydrocolloid technique: its advantages and disadvantages. J. Pros. Den. 1:727 Nov. 1951.

a crown restoration can be modified easily to re-establish the cervical curvature at a level which will protect the free gingiva and direct food away from the vulnerable crest of the gingiva.

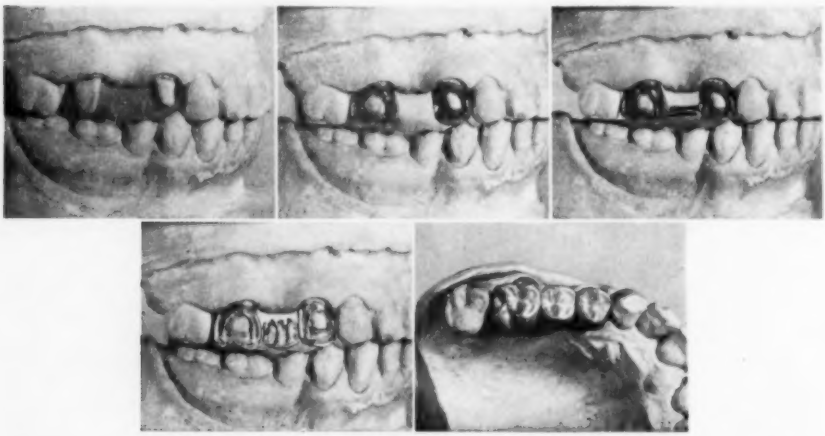
Occlusal form prepared with cusps having supplemental ridges can be coordinated easily using a talcum powder as a visual aid. Supplemental grooves and balance enhance chewing and minimize the reflected stresses on the supporting alveolar bone. Alignment and good buccal form are readily obtained when preparing the abutment out of the mouth. The window recess in the crown, to receive porcelain or plastic (injected), can be prepared conveniently. A crown fabricated for esthetics can be surveyed for alignment and form to coincide with the arrangement of the remaining teeth, unimpaired and with every advantage for the production of an exceptionally nice result.

COMPLETE MOUTH REHABILITATION

Hydrocolloid plays its greatest role in the rehabilitation of natural teeth to cuspal coordination. Dental arches with many teeth missing, worn-out bridges and fillings and a loss of vertical dimension may be restored to normal physiologic function with a remarkable degree of accuracy and less time at the chair and in the laboratory.

The dimensional accuracy and exactness of duplication of cavities, margins and soft tissue making up the entire arches permit construction of this type of work at the bench without interruption by the patient, or without fitting patterns in the mouth, trying-in bridges for the assemblage of the final solder joint, adjusting contacts or checking the fit of a gold skeleton for the partial denture.

Full mouth reconstruction by the indirect method is aided by an adjustable



Cast assembled bridge • Above left: Complete models facilitate articulation, alignment and construction of bridge. Above center: Patterns are developed on individual dies, and transferred to master model for occlusal correction, adjusting contact points and general form. With aid of supplemental dies, crowns are provided with windows and grillwork to receive plastic (injected) facings. Above right: Half-round wax bars (16 gauge) are attached to abutments and projected into the edentulous space. Below left: Bridge is assembled by casting gold pontic around two gold bars projected from gold abutments. Below right: Occlusal anatomy and general form simulating nature are sculptured easily with indirect technic

face-bow for orienting the casts in the articulator and a dual tracing instrument for registering jaw relationships—centric, lateral and protrusive. The registration instrument is made to fit the models and the mouth in a like manner, a feature possible through the accuracy of the models. The instrument is stabilized by two cast metal plates, upper and lower, with attached inlays which rest on strategically located prepared teeth.

The two plates are seated securely and held in position against the teeth by a center screw and bearing plate located to distribute the closing force and maintain the previously selected freeway space.

After the orientation of the models in the articulator with an inclination which the arches maintain in the living subject and in which the interarch positions of the jaws are reproduced, the model is surveyed for occlusal, buccal and labial alignment. The teeth are formed and sculptured in wax for each of the preparations and the edentulous spaces. The wax restorations with anatomical form are balanced for reciprocal cusp relation, providing an architectural model in wax and a visual picture of the prosthesis before it is converted into hard restorative materials.

SUMMARY

Multiple restorations which include the fixed bridge, the precision partial denture and the single crown can be constructed and related one with the other on hydrocal models without the necessity of checking or fitting in the mouth.

Prostheses can be constructed, assembled and finished with the aid of master solid models and supplemental dies. Contacts for the single crown can be adjusted at the bench, and the bridge assembled and finished with the facing fixed to the pontics without the presence of the patient.

The indirect hydrocolloid technic represents a scientific advancement that benefits both patient and operator.

409 North Camden Drive

Benefits of Civilization • My own feeling is that our age will be remembered chiefly for having been the first age since the dawn of civilization in which people dared to think it practicable to make the benefits of civilization available to the whole human race. *Arnold Toynbee, Civilization on Trial.*

Root end amalgam technic in the practice of endodontics

Samuel Luks, D.D.S., New York

Amalgam has long been used to fill an exposed apical foramen after apicoectomy, but the technic described herein embodies several innovations which make it a valuable adjunct when routine endodontic procedures cannot be carried out successfully.

The use of the technic is limited essentially to the upper anterior teeth when the normal approach to the root canal is blocked; for example, in completely calcified canals; in teeth where gold posts have been cemented to place to carry a porcelain jacket; for teeth in which an instrument has broken and the instrument cannot be removed or bypassed, or for very wide root canals in young patients where the apex is funnel-shaped and where no amount of effort will obturate the funnel completely.

The preparation of the patient and the operative procedures are basically the same as are used for apicoectomy, with a few modifications related to the cutting and preparation of the root end for the delivery and plugging of the amalgam.

TECHNIC

The extent and outline of the mucoperiosteal flap should be well planned so as to uncover a generous area. A skimpy approach will not permit adequate working space and will handicap the operator so that he will not be able to carry out all the details required in this technic. Furthermore, when the flap is replaced, it should rest on a firm base of supporting bone. It is far better to have more working space than is necessary than it is to have too little.

After reflection of the mucoperiosteal flap, enough labial bone is removed to expose the upper third of the root end. Curets and aspirator are used to clean out all diseased tissue. A suitable bur is used to bevel the root end so that the surface slants toward the operator at an angle of 45 degrees. An explorer is used to locate the orifice of the root canal. An inverted cone bur in a contra angle, commensurate in size with the root surface, is brought to the orifice and an undercut preparation is made so that the amalgam filling will be retained adequately (Fig. 1, above left).

The entire periapical region is now checked, and any remaining diseased tissue and debris removed. Oxycellulose is packed into the bone cavity and around the root surface to secure a dry field so as to prevent any amalgam particles from escaping into the surrounding bone where it cannot be retrieved (Fig. 1, above right). The root surface and preparation are now sterilized and dried to receive the amalgam filling.

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Although amalgam requires considerable care in the handling and the application, it is the material of choice. Amalgam hardens quickly and has an ultimate expansion which gives the desired effect of a rapidly applied hermetic seal. Since it is a heavy metal, it does not require special sterilization, and it is well tolerated *in situ*. Proper manipulation of the amalgam is not difficult. The amalgam should be fairly dry and be separated into particles of about 1.5 mm. so that each particle may be picked up with thumb forceps.

The delivery of the amalgam particles to the root end should be careful and well planned. Each particle picked up should be accounted for to make sure that none have escaped into the bone. Figure 1, below left, illustrates the method that has been found most practicable in achieving this objective. Thumb forceps are used to carry the small particle of amalgam (amalgam carriers have been found unsatisfactory chiefly because they cannot handle such small particles); the amalgam then is placed over the preparation and is packed into the retention form with small pluggers (Fig. 1, below right). This step is repeated until the amalgam is flush with the root surface. A ball burnisher is used to smooth the amalgam.

The area is now searched for any amalgam particles that may have escaped. The oxycellulose pack is removed and a clean, bony cavity free of any foreign materials is revealed. The final inspection should be thorough and painstaking. The mucoperiosteal flap is replaced and

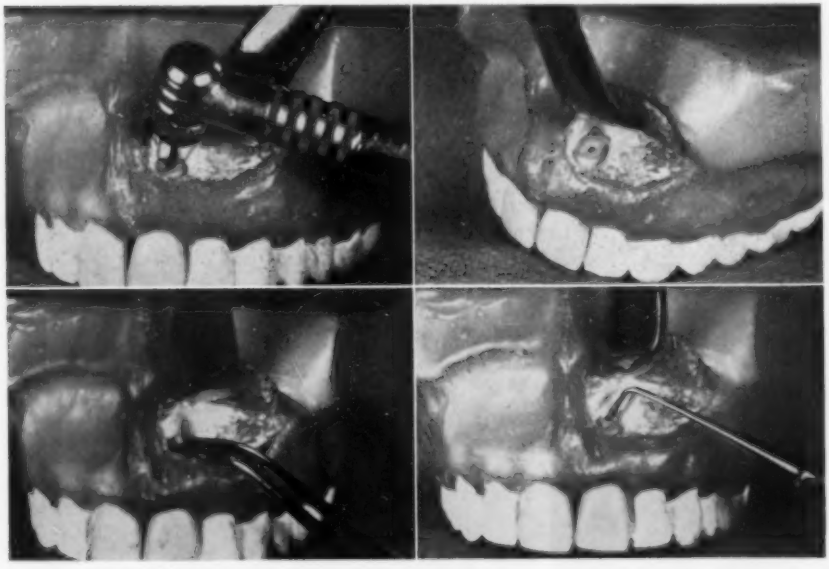

Fig. 1 • Above left: Small inverted cone bur in the contra angle is carried to orifice of root end and an undercut preparation made to receive amalgam filling. Above right: Root end after being cut to angle of 45 degrees so root surface faces operator. Bone cavity has been packed with oxycellulose so only root surface is exposed. Below left: Small dried particle of amalgam is brought to root end and placed over preparation ready to be condensed. Below right: Cylindrical end of plastic instrument is used to pack amalgam into root end, one particle at a time

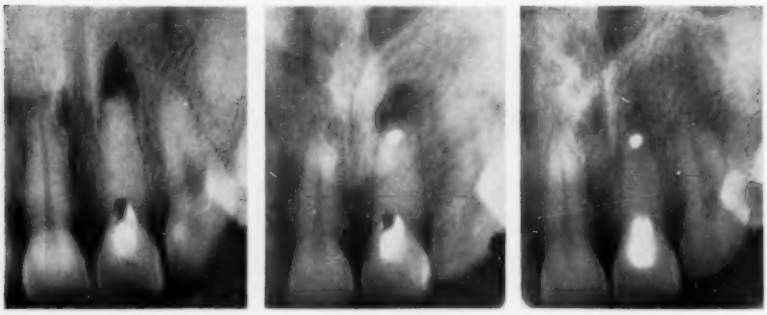

Fig. 2 • Completely calcified upper left central incisor with radiolucent area. Left: Unsuccessful attempt to locate root canal through usual approach. Center: Postoperative view with amalgam filling in place at apex. Right: View taken after two years showing complete healing

sutured, and customary postoperative care is given.

REPORT OF CASES

Case 1 • A 22 year old girl had a completely calcified upper left central incisor. An unsuccessful attempt had been made to find the root canal through the customary approach through the crown of the tooth (Fig. 2, left). Clinically, the tooth was tender to percussion, and a large area of bone destruction was evident roentgenographically, which led to the conclusion that, although complete calcification had taken place, a remnant of the canal was still present at the apex with necrotic pulp tissue that finally caused the ultimate flare-up in this long standing chronic process. This type of difficulty usually is the result of an old traumatic injury. Figure 2, center, shows the amalgam filling in place at the apex, and Figure 2, right, the excellent condition two years later.

Case 2 • The patient, a middle aged woman, had an upper left central incisor

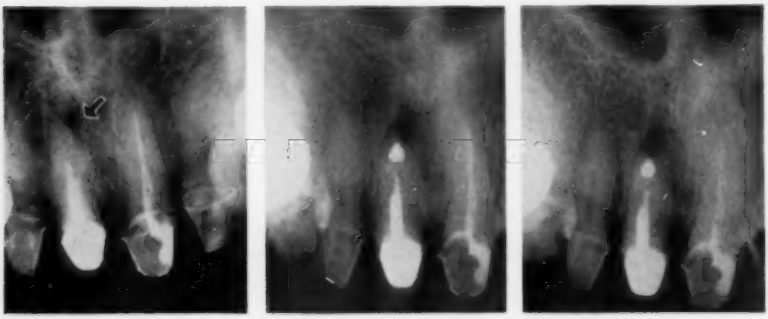

Fig. 3 • Left: Upper left central incisor carrying a cast gold post and porcelain jacket. Note incomplete root canal filling and periapical breakdown of bone. Center: Postoperative view with amalgam filling in place. Right: Six months later; complete filling in of bone

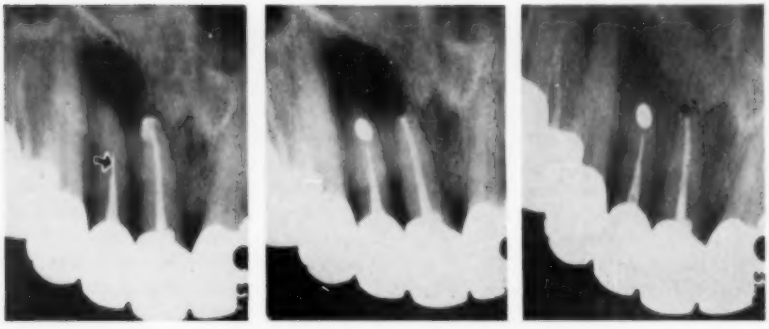

Fig. 4 • Left: Upper left central incisor with broken instrument approximately half way up the canal. Center: Postoperative view with amalgam filling in position. Right: Condition nine months later

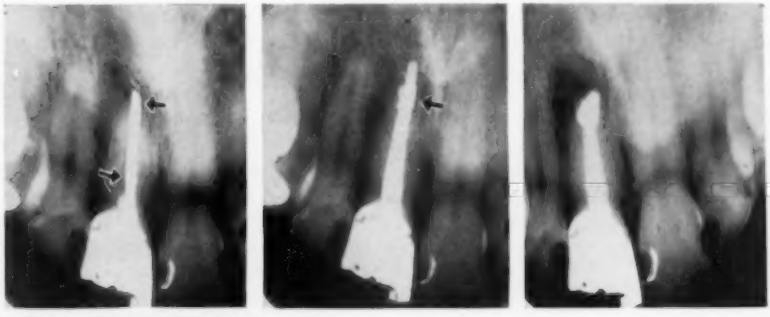

Fig. 5 • Above left: View showing misuse of silver point in wide canal. Note existing lateral spaces. Above center: After filling with gutta-percha, apical lateral spaces still present. Above right: Postoperative view after amalgam filling. Note obturation of lateral spaces at apex. Below left: After six months: notice excellent healing and filling in of bone

that contained a cast gold post that supported a porcelain jacket which had been placed over an incomplete root canal filling. Figure 3, left, illustrates the periapical breakdown of bone. The patient had no specific complaint; the condition had been discovered in a routine roentgenographic check-up.

The removal of a porcelain jacket and cast gold post is an expensive and hazard-

ous undertaking. Even after successful removal of these parts, there would be no assurance of being able to get through to the apex and eliminate successfully a long-standing chronic condition. The amalgam technic was used successfully which permitted the restoration to remain in service (Fig. 3, center). Figure 3, right, shows the excellent healing six months after the operation.

Case 3 • A middle aged woman came for treatment because of an acute flare-up over the upper right central and lateral incisors. These teeth were among several that had been stabilized with an extensive splint. During the course of routine endodontic treatment, an instrument had been broken in the lateral incisor (Fig. 4, left). The instrument could not be removed or bypassed. Through the use of the amalgam technic, an expensive and well constructed splint did not have to be sacrificed (Fig. 4, center). Figure 4, right, shows the healing that had taken place after one year. An invaluable service was rendered the patient through preservation of an extensive restoration.

Case 4 • A 19 year old boy had had a fractured central incisor with incomplete apex formation. When the patient was about eight years old, an attempt had been made to fill a very wide canal with a single silver point. Figure 5, above left, shows the lateral spaces that were present. Tissue fluids collected, stagnated and became necrotic in these spaces, resulting in a breakdown on the periapical bone.

The silver point was removed and the necrotic contents cleaned out. After sterilization, the root canal was packed with gutta-percha (Fig. 5, above center). Because of the flaring of the apical walls, it was still impossible to obturate the lateral spaces at the apex. Here again, the amalgam technic was an invaluable aid in sealing off the root end completely (Fig. 5, below left).

COMMENT

There are, perhaps, other indications for the use of the amalgam technic that have not been mentioned here. The technic is a valuable aid in what otherwise seems to be hopeless situations. Many teeth and restorations can be kept in service through the judicious application of the procedures described.

39 East Thirty-sixth Street

Science • Certainly no Greek philosopher, revisiting the world today, would rest content with a superficial knowledge of the results of modern science, or admit that a man wholly unacquainted with its foundations had had a really liberal education. He would surely condemn him as a misfit, a creature unsuited to its environment. *Lord Milner*

Temporary splinting for multiple mobile teeth

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Periodontal treatment is difficult in a mouth with many mobile teeth. Splinting frequently provides the stability necessary for such procedures as scaling, curettage, occlusal equilibration and periodontal surgery. Efficient mastication and effective toothbrushing and home care are facilitated by splinting. A simple, rapid, efficient and economical method of splinting multiple loose teeth, as an aid to periodontal therapy, is described. The suggested method is applicable to all quadrants of the mouth, and most nearly fulfills the requirements of an ideal temporary splint.

Applicability to all parts of the mouth is desirable because of the great stabilization attainable by splinting around the arch. The mechanical and physiologic values of splinting around the arch have been emphasized.[1] Experimental evidence[2] indicates that the stabilizing power of the splint is directly proportional to the distance between the abutments in the direction of the stress. Multidirectional splinting around the arch provides maximum resistance against the multidirectional forces which occur in the mouth[1] (Fig. 1).

AN IDEAL SPLINT

An ideal splint should possess the following qualities: (1) simplicity and facility of construction and application; (2) economy of construction; (3) stability and efficiency; (4) accessibility to hygienic procedures by patient; (5) nonirritation to the gingival and oral tissues; (6) noninterference with other periodontal treatment; (7) applicability to all parts of the mouth and (8) esthetic acceptability.

TEMPORARY SPLINT

The use of the temporary splint is indicated in the following circumstances:

1. Where mobility of the teeth exists, so that physiologic rest can be effected.
2. Where mobility exists to such a degree that effective periodontal treatment and procedures cannot otherwise be executed properly.
3. As a diagnostic aid to evaluate the prognosis before instituting extensive permanent splinting.
4. To improve the morale of the patient with mobile teeth.

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1. Simring, M. Splinting: theory and practice. J.A.D.A. 45:402 Oct. 1952.

2. Smyd, E. S. Principles of foundational capacity of dental investing tissues. (Abst.) J.D.Res. 31:498 Aug. 1952.

LIMITATIONS OF OTHER SPLINTING TECHNICS

Each of the other splinting technics—permanent splinting, wire ligatures, removable splints, orthodontic bands and intradental splinting — has important limitations.

Permanent Splinting[1,3,4] • The time required to construct a permanent splint may delay unduly the necessary periodontal procedures. Such delay may lead to eventual loss of teeth. Permanent splinting may not be necessary for management of the problem. Time and considerable effort are required to prepare multiple mobile teeth for fixed splinting. Finally, the permanent splint is costly to construct.

Wire Ligatures [1,3-5] • The use of wire ligatures is restricted to the anterior region of the mouth, unless the posterior teeth have constricted necks or heavy roots, or unless self-curing acrylic resin is used to engage the wire, as suggested by Simring.[1] Other limitations of wire ligatures are that they are unesthetic, they may loosen or fray, and they cannot be added to or extended easily to include additional teeth in the splint, if this should be desired after the splint has been placed. Also, wire ligatures may irritate the soft tissues of the mouth, and may act as a food trap.

Removable Splints[1,3,4] • The use of the removable type of splint generally is limited to one small segment of the mouth because of varying axial inclinations of the teeth. Vertical forces are generally not resisted adequately by this type of splint. Repeated removal and insertion of the appliance may further loosen previously mobile teeth. The bulkiness of the appliance may be irritating to the patient.

Orthodontic Bands[6,7] • Lack of proper contact is inherent in the use of orthodontic bands. They may require separation of teeth, and they are unesthetic unless covered by acrylic resin.

Intradental Splinting[8] • In the intradental splinting technic devised by Obin and Arvins, the teeth are notched and undercut, and self-curing acrylic resin is painted into the notches. This technic involves destruction of tooth structure and is applicable only if permanent fixed splinting will be undertaken ultimately.

SOLUTION

The method proposed here involves simple ligation of the teeth followed by application of a self-curing acrylic resin so that the ligature becomes embedded in the resin. The resin engages the occlusogingival curvature of the teeth to prevent the splint from slipping gingivally or occlusally; by using the ligature alone, such slipping might occur. Ligation is done in separate segments according to the anatomy of the teeth; the ligated segment is affixed to the other units in the arch with self-curing acrylic resin. A continuous fixed splint around the entire upper or lower arch may be accomplished, if necessary.

Materials • The materials used in the temporary splint for multiple mobile teeth are white, braided, silk ligature or braided, dead, soft, stainless steel ligature (U.S.P. size 0); self-curing acrylic resin; straight and contra-angle sable brushes

3. Miller, S. C. Textbook of periodontia, ed. 3. Philadelphia, Blakiston Co., 1950.

4. Sorrin, S. Use of fixed and removable splints in the practice of periodontia. Am.J.Orthodont. & Oral Surg. (Oral Surg. Sect.) 31:354 June; correction 454 July 1945.

5. Hirschfeld, L. Use of wire and silk ligatures. J.A.D.A. 41:647 Dec. 1950.

6. Chaiken, B. S. Temporary splinting in periodontal therapy. Alpha Omegan 47:97 Sept. 1953.

7. Friedman, N. Temporary splinting. An adjunct in periodontal therapy. J.Periodont. 29:229 Oct. 1953.

8. Obin, J. N., and Arvins, A. N. Use of self-curing resin splints for the temporary stabilization of mobile teeth due to periodontal involvement. J.A.D.A. 42:320 March 1951.

(size 00), and single strand, dead, soft, stainless steel ligature 0.007 inches in diameter.

Technic • The teeth are ligated with either the braided wire or silk. A ligature of braided wire is stronger than one of silk, and tends to remain cleaner; however, it is much more difficult to manipulate.

For the posterior teeth, the ligature is placed at the height of contour (the greatest buccolingual diameter), circling each tooth twice in a double loop which provides added retention for the acrylic resin. Excessive tightness of the ligature should be avoided lest it slip subgingivally.

It may be necessary to insert temporarily a supraocclusal wire, 0.007 inches in diameter, to hold the arch wire in place during placement of the braided ligature and application of the acrylic resin. Such supraocclusal wire is removed on completion of the resin application (Fig. 2).

For the anterior teeth, the ligature, wound around the teeth in a figure eight manner, is placed incisally to the cingulum but gingivally to the contact point (Fig. 3, above). An alternate method of

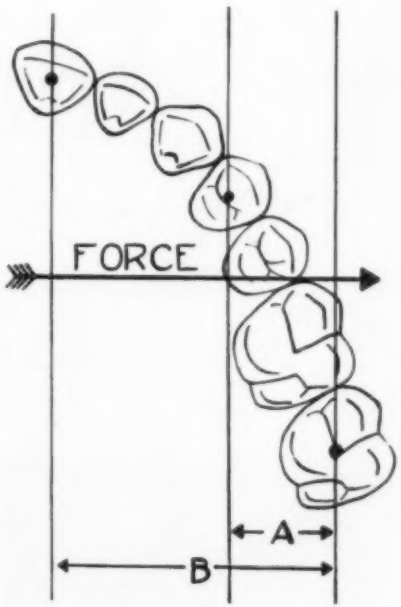

Fig. 1 • Resistance to buccolingual force is relatively poor when splint runs from first bicuspid to second molar because of small distance (A) in buccolingual direction between second molar and first bicuspid. When splint is extended to central incisor, effective buccolingual distance is increased to (B), which is much greater than (A) and, therefore, provides superior resistance to force in a lateral (buccolingual) direction

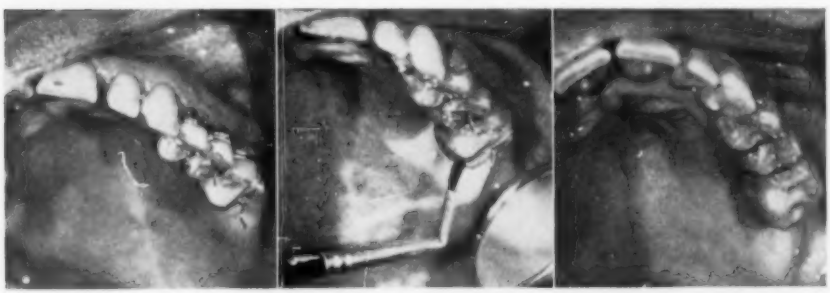

Fig. 2 • Left: Braided, dead, soft, stainless steel ligature placed about teeth. Supraocclusal wire retains ligature. Center: Self-curing acrylic resin applied with sable hair brush to cover braided buccolingual ligatures. Supraocclusal wires are not covered. Note right angle brush. Right: Supraocclusal wires cut off, and acrylic resin trimmed and polished to provide finished splint. This section forms part of splint illustrated in Figures 7 and 8

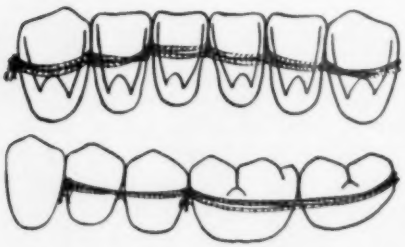

Fig. 3 • Above: Ligation of lower anterior region in figure eight manner prior to application of acrylic resin. Below: Alternate method of ligation in which several teeth of similar anatomy have been encircled by the loops of ligature instead of each tooth being encircled individually

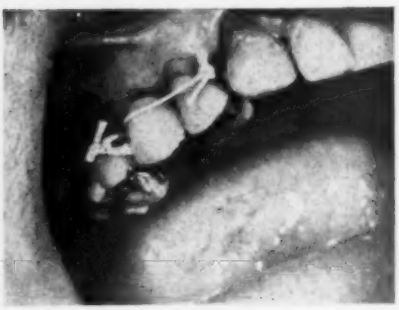

Fig. 4 • Silk ligature applied to upper right posterior teeth according to alternate technic illustrated in Figure 3, below

Fig. 5 • Completed splint after application of self-curing acrylic resin

ligation may be used in which a double loop is tied to encircle two or three teeth of comparable anatomy (Fig. 3, below). For convenience, a separate piece of ligature may be used for each loop. For the posterior teeth, the ligature is placed at the buccolingual height of contour and gingivally to the contact point. This fairly simple technic is of particular value in relatively inaccessible regions, but it produces a rather bulky splint (Fig. 4 and 5).

Where the contact point between teeth is tight or inaccessible, a loop of fine spring steel wire, 0.006 inches in diameter, may be used to pull the ligature between the teeth (Fig. 6). This procedure utilizes the principle of the blind man's needle threader.

Acrylic resin is applied by the nonpressure method.[9] Right-angle sable hair brushes, size 00, are useful in reaching the distal surfaces of molars (Fig. 2, center). Where it appears likely that the acrylic resin may impinge on the interproximal gingiva, wax may be packed into the interproximal regions before the resin is applied; the wax may be removed later, as suggested by Shack.[10] A completed splint after application of the acrylic resin is shown in Figure 5.

A dry field of operation is essential to permit effective intermingling of the acrylic resin with the fibers of the ligature. An antisialogogue may be used for this purpose. Either 100 mg. of methantheline bromide (Banthine Bromide) or 0.01 grain of atropine sulfate may be given the patient 45 minutes before treatment.

Limitations • The limitations of this method of splinting are as follows:

1. The splint is subject to fracture unless extreme caution is exercised in checking the occlusion.

9. Nealon, F. H. Acrylic restorations: operative nonpressure procedure. New York J. Den. 22:201 May 1952.
10. Shack, Aaron. Personal communication.

2. The splint makes it difficult to clean the teeth and massage the gingival tissues. Decalcification of the teeth has been observed in a few patients whose splints were left on for very long periods of time.

3. Temporomandibular joint disturbance due to occlusal aberration may result from the rigidification of a mobile tooth in supraocclusion. With several patients, failure to adjust the occlusion induced a "click" in the temporomandibular joint; the occlusal interference and the temporomandibular joint disturbance were alleviated by grinding.

4. The patient may be annoyed by the bulkiness of the splint.

5. The appliance may act as a food trap, resulting in horizontal food impaction, which in turn may create an edematous shelf of tissue (Fig. 7).

Home Care • The patient must cooperate in the treatment. Diligent home care is essential. A modified Charter's toothbrushing technic is demonstrated to the patient. For cleanliness, lavage is necessary; the patient is advised to irrigate the splinted teeth with a stream of water from a commercial spray attachment, the head of which has been removed, as advised by Miller.[11] Rubber tip stimulation interdentally is imperative.

A regular checkup is essential. The splint should be removed after not more than four months, and a thorough prophylaxis and examination performed. A new splint may then be applied if necessary.

RESULT

The simple new method of splinting described makes firm and stable all members of the dental arch, to permit effective periodontal procedures (Fig. 8). The gingival tissues may assume normal, healthy tone, color and form as inflammatory signs vanish.

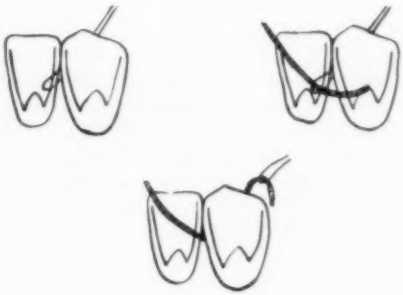

Fig. 6 • Fine wire loop used to draw ligature easily through tight contact point

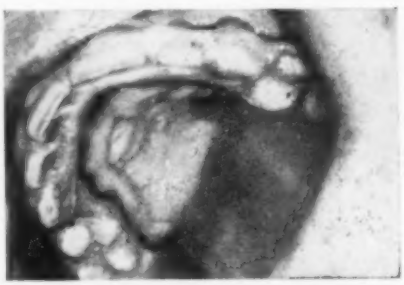

Fig. 7 • Palatal ledge of edematous gingival tissue formed as a result of foods lodging between bulky splint and gingiva when patient's prophylactic procedures were inadequate

Fig. 8 • Ligature and acrylic splint supporting all teeth in patient with advanced periodontal disease with mobility of all teeth

SUMMARY

A simple, rapid, efficient and economical method of splinting multiple loose teeth as an aid in periodontal therapy is described. The method is applicable to all quadrants of the mouth, and most nearly fulfills the requirements of an ideal temporary splint.

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11. Miller, S. C. Oral diagnosis and treatment, ed. 2. Philadelphia, Blakiston Co., 1946, p. 357.

Endodontics: selection of cases and treatment procedures

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The purpose of this paper is to call attention to factors which enter into the selection or rejection for treatment of pulpally involved teeth. It will also discuss well directed and effective treatment procedures which supplement the required initial selection.

SELECTION OF CASES

A favorable prognosis for any restorative or replacement procedure depends primarily on an accurate analysis of conditions initially present. A consideration of indications or contraindications for the planned restoration or appliance is demanded to assure efficiency in the final result. Many failures in the mouths of patients can be attributed to injudicious initial planning of the treatment.

The selection of cases for endodontic therapy is also of utmost importance in the ultimate success or failure of endodontically treated teeth. The commendable attitude of those who are willing to attempt to maintain pulpally involved teeth in the mouth by root canal therapy can be nullified by unwise selection of cases for treatment. A knowledge of conditions that are favorable or unfavorable for treatment is gained through experience. The importance of selection of cases for endodontic treatment has been pointed out and discussed in the literature by Appleton,[1] Blayney,[2] Coolidge,[3] Grossman,[4] Jasper[5] and others.

Experience—whether pleasant or unpleasant—and the utilization of the knowledge and experience of others as expressed in the literature, make it possible to determine criteria for selection of teeth for endodontic treatment. In essence, these criteria require an appraisal

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1. Appleton, J. L. T., Jr. A report on an attempt to formulate a policy on the management of the pulpless tooth. D. Cosmos 75:50 Jan. 1933.

2. Blayney, J. R. Root-canal therapy, diagnosis and therapeutics. D. Cosmos 70:380 April 1928.

3. Coolidge, E. D. Clinical pathology and treatment of the dental pulp and periodontal tissues, ed. 2. Philadelphia, Lea & Febiger, 1946, p. 78.

4. Grossman, L. I. Root canal therapy, ed. 3. Philadelphia, Lea & Febiger, 1950, p. 177.

5. Jasper, E. A. Root-canal therapy in modern dentistry. D. Cosmos 75:823 Sept. 1933.

and a consideration of: (1) systemic conditions; (2) local conditions; (3) tooth essentiality and (4) endodontic ability on the part of the operator.

Systemic Conditions • As in general surgical procedures, endodontic treatment demands an initial survey of the patient's general health. Debilitating abnormalities and active infectious diseases not only can interfere with anticipated normal response to pulp canal treatment but can render it impossible. Conversely, a possible acute apical periodontal exacerbation incident to treatment can aggravate a pre-existing morbid systemic condition. In lieu of an available adequate medical history of the patient, it is mandatory that the dentist consider objective and subjective symptoms in order to appraise the physical condition of the patient. If the slightest doubt exists as to good health, a referral to a physician for a comprehensive physical examination should be made. The lack of a concise picture of favorable systemic conditions, however, does not necessarily obviate the possibility of pulp therapy. The use of antibiotics parenterally and close cooperation with the physician may permit endodontic treatment in borderline cases. Acutely active infectious diseases may present contraindications for both extraction and canal treatment. In such instances, apical periodontal drainage by way of the root canal or by mucosal incision must be established and maintained until systemic improvement warrants one or the other of the afore-mentioned procedures.

Local Conditions • The existence of certain conditions in a carious tooth may contraindicate the use of a particular restorative material. Existing conditions in a pulpally involved tooth also can prevent the effective rendering of conservative endodontic treatment, that is, without surgical intervention. Other conditions may require surgical intervention in the form of either apicoectomy or apical curettage after endodontic treatment.

Listed below are some of the more frequently encountered conditions which contraindicate conservative endodontic procedures. Those indicated by asterisks can be treated but require subsequent surgical intervention:

1. Inaccessible root apex.
   A. Abrupt curvature of the root canal.
   B. Excessive diminution of the canal by secondary dentin.
   C. Irretrievable broken file, reamer, and so on, in the canal.
   D. Multiple accessory foramens.
   E. Irremovable pulp stones.
   F. Dens in dente.

2. Abnormal root-end condition.
   A. Extensive apical periodontal involvement.
   B. Cyst.
   C. Root end resorption.
   D. Apical crater shaped termination of the canal.
   E. Excessive size of apical foramen.
   F. Communication of apical periodontal involvement with mouth through gingival crevice.

3. Crown or root damage.
   A. Crown not capable of subsequent restoration.
   B. Condition of crown not conducive to aseptic technic.
   C. Root fracture in apical third.
   D. Perforation of wall of apical third of canal and root by reamer, file, and so forth.

Tooth Essentiality • Many times the pulpally involved tooth creates a situation whereby its removal would cause a complicated condition to develop in the arch. The essentiality or strategic value of such a tooth demands that it be maintained in the mouth by carefully directed

endodontic treatment. The consequent filling of its verified sterile canal by an adequate canal filling material eliminates the pretreatment dilemma for which the tooth had been responsible.

Tooth essentiality is increased when its retention is needed for:

1. Space maintenance.
2. More efficient fixed bridge or partial denture construction.
3. Preservation of the integrity of a fixed bridge or partial denture for which the tooth is supporting an attachment or clasp.
4. Prevention of operating procedures on adjacent teeth that would be necessary if the tooth had to be replaced with a fixed bridge.
5. Elimination of complex problems concerned with its replacement.
6. Salvation of an adequately placed restoration under which pulpal degeneration has occurred.
7. Protection of the general health of the patient when extraction is contraindicated.
8. Maintenance of the arch as an entity when no other teeth have been previously extracted.
9. Other miscellaneous reasons which may occur.

Endodontic Ability • Because of the exigencies and requirements of everyday dental practice, it is impossible for a dentist to practice all branches of dentistry. Some of the branches are limited to specialists in those fields.

Endodontic therapy requires particular training, and although it may not be unanimously considered a specialty, it certainly does come close to being a specialty. Some dentists — endodontists — limit their practices to endodontic therapy exclusively. Others include it to some extent in their practices. For still others, it is impossible to render endodontic treatment because of their concentration on other dental services for their patients. As a consequence it is obvious that a wide range of endodontic ability exists. It is incumbent on the individual dentist to analyze his own endodontic ability to carry the particular treatment through to a satisfactory conclusion. Awareness of his own shortcomings or limitations of endodontic ability should prompt him to refer the patient to one having special training and ability in endodontics.

TREATMENT PROCEDURES

An adequate diagnosis of the condition of the pulp must be made in order to assure the application of correct or demanded treatment procedures. Although many descriptive terms have been suggested for the various pulpal diseases, the following modification of a listing advocated by Grossman[6] is advantageous because of its simplicity:

1. Pulpitis
2. Necrosis
3. Apical periodontal involvement
   - A. Acute apical periodontitis
   - B. Acute apical periodontal abscess
   - C. Chronic apical periodontal abscess
   - D. Subacute apical periodontal abscess
   - E. Granuloma
   - F. Cyst

Diagnosis of pulpal disease is determined by the responses to clinical tests, by roentgenographic examinations, by the evaluation of the clinical condition of the pulp and by the application of knowledge of symptomatology. With the diagnosis ascertained, an understanding of the objective, or that which is to be accomplished during each appointment, facilitates the efficient rendering of the treatment.

The treatment objectives and procedures can be outlined as follows.

6. Grossman, L. I. Root canal therapy, ed. 3. Philadelphia, Lea & Febiger, 1950, p. 57, 81.

1. Pulpitis

First appointment

Objectives:
A. Pulpal sedation
B. Reduction of pulpal bacterial activity

Procedures:
A. Caries excavation
B. Eugenol treatment

Second appointment

Objective:
A. Pulp extirpation

Procedures:
A. Local anesthesia
B. Access to canal
C. Pulp extirpation
D. Eugenol treatment

Third appointment

Objective:
A. Obturation of canal

Procedures:
A. Canal enlargement
B. Obturation of canal

2. Necrosis

First appointment

Objective:
A. Initial reduction of canal sepsis

Procedures:
A. Removal of entrance to canal
B. Elimination of pulp chamber debris
C. Cresol treatment

Second Appointment

Objective:
A. Completion of reduction of canal sepsis

Procedures:
A. Complete mechanical cleansing of canal
B. Chlorinated soda (USP) irrigation of canal
C. Camphorated monochlorophenol treatment

Third appointment

Objectives:
A. Verification of canal asepsis
B. Enlargement of canal

Procedures:
A. Bacteriologic culture test
B. Enlargement of canal with files, reamers and so forth
C. Fitting of master gutta-percha point
D. Beechwood creosote treatment

Fourth appointment

Objective:
A. Obturation of canal space

Procedure:
A. Obturation of canal

3. Apical periodontal involvement

Objectives of treatment:
A. Removal of cause, that is, pulpal decomposition products
B. Obturation of canal space

Summary of treatment:
A. Drainage through root canal and parenteral use of antibiotics in acute conditions
B. Same general procedures as in treatment of necrosis
C. Surgical intervention if needed

It is not intended to imply that the use of the particular therapeutic remedies indicated in the foregoing treatment plans are mandatory. Actually, the function of any drug in the treatment of the canal is secondary in importance to the thorough mechanical removal of the pulpal material. For pulpal sedation and reduction of bacterial activity in pulpitis, drugs other than eugenol which can be used with adequate effectiveness are phenol compound, metacresyl acetate, beechwood creosote and others. The drugs indicated for use in the treatment of necrosis need not be applied in the sequence mentioned. Rotation of them in any order may elimi-

nate the possibility of development of microorganism tolerance for one drug if it were used solely throughout the treatment procedures. The obturation of the sterile root canal has been described previously by Healey.[7]

Since the action of germicidal agents is lessened in the presence of organic material, it is imperative that all pulpal material and decomposition debris be mechanically eliminated from the canal. This may be accomplished more safely at the second treatment appointment, since the action of the initial drug treatment will have lessened the amount of canal sepsis to some extent at least. By using a barbed reamer and working progressively from the entrance of the root canal to its apical end, all loose debris can be removed. Because of a slight dissolving action of a chlorinated soda solution on pulpal debris adhering to the walls of the canal, the removal of such debris by files and reamers is facilitated by the irrigation of the canal with the solution. Mechanical lavage and the antiseptic action of the solution assist the reamers and files in preparing the canal properly to permit a more effective action of the germicidal agent which is to be sealed into the canal.

SUMMARY

1. Success in endodontic therapy is enhanced by judicious selection of cases followed by adequate treatment procedures.

2. The selection of a pulpally involved tooth for endodontic treatment is based on a consideration of (1) systemic conditions, (2) local conditions, (3) tooth essentiality and (4) endodontic ability of the operator.

3. After the determination of the diagnosis of the pulpal disease, well directed and purposeful treatments provide a sterile condition in the root canal. The subsequent obturation of the canal space completes the effective endodontic treatment of the tooth.

7. Healey, Harry J. Simplified and effective methods for filling root canals. U. S. Armed Forces M. J. 5:103 Jan. 1954.

Research and Progress • We have always been inclined to think of research and technology as being consciously related to human welfare. Now, frankly, we are not sure, and we are troubled by the realization that man's brain can create things which his will may not be able to control. *Raymond B. Fosdick.*

Problems and limitations of cephalometric analysis in orthodontics

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Contemporary orthodontic literature devotes more space to the diagnosis of malocclusions than ever before. As a result, there has been a de-emphasis on the actual mechanics of tooth movements, with the fuller realization that the greatest problems are not mechanical, but morphogenetic and physiologic. To a great extent, cephalometric roentgenography has been responsible for this reorientation of orthodontic thinking and writing. Plaster casts, dental roentgenograms, photographs and the patient are no less important as diagnostic criteria; cephalometrics actually makes each of these criteria more valuable by extracting more information from each and correlating them.[1]

The excellent growth and development studies of Broadbent at Western Reserve, of Brodie and his co-workers at Illinois and of Thompson and his associates at Northwestern, through the medium of cephalometric roentgenography, are of infinite value.[2-7] The use of cephalometric roentgenograms in the study of craniofacial abnormalities and in the longitudinal appraisal of orthodontic therapy, during and after active treatment, is unchallenged.[8,9] Cephalometrics is an important adjunct in studies of the function of the stomatognathic system.[10] As with any technic or medium, however, there are definite limitations and circumscribed areas of the field.

In line with man's tendency to classify and categorize information, cephalometric analyses have been developed to serve as clinical tools, and arbitrary "norm standards" have been set up for facial and dental relationships to serve as therapeutic goals. The infinite variability of craniofacial morphology and the complexities of function do not lend themselves well to group standards, however. Mathematical expressions of facial and dental relations have tended to oversimplify some of the problems.[11]

Associate professor, department of orthodontics, Northwestern University School of Dentistry.

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2. Broadbent, B. H. A new x-ray technique and its application to orthodontics. Angle Orthodont. 1:45 Jan. 1931.

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5. Bjork, A. Discussion on the significance of growth changes in the facial pattern and their relationship to changes in occlusion. D. Record 71:197 Nov. 1951.

6. Thompson, J. R. Oral and environmental factors as etiologic factors in malocclusion of the teeth. Am. J. Orthodont. 35:33 Jan. 1949.

7. Donovan, R. W. A radiographic cephalometric consideration of facial growth during orthodontic treatment. Am. J. Orthodont. 39:341 Aug. 1953.

8. Graber, T. M. The congenital cleft palate deformity. J.A.D.A. 48:375 April 1954.

9. Hagihara, E. A. A study of the facial and skeletal changes of Class II, Division 1 malocclusion. Masters' thesis, Northwestern University, 1953.

10. Thompson, J. R. Concepts regarding function of the stomatognathic system. J.A.D.A. 48:626 June 1954.

11. Graber, T. M. A critical review of clinical cephalometric radiography. Am. J. Orthodont. 40:1 Jan. 1954.

Cephalometrics is no panacea, alone or in conjunction with other records. There are certain aspects of cephalometric analysis in orthodontics that must be understood fully, if objectivity is the goal. For the convenience of discussion, these are divided into headings—technical aspects; reliability of landmarks; mensuration; reliability of clinical cephalometric criteria.

TECHNICAL ASPECTS

The positioning of the patient is one of the first problems encountered. Since the introduction of the Broadbent-Bolton cephalometer in 1931, a number of different headholders, cephalostats or orienting devices have been developed. They all use ear inserts as a means of positioning the head of the patient (Fig. 1, 2). Most instruments are set up with a constant 60 inch target-midsagittal plane distance for a straight lateral headplate, and the same x-ray tube-ear rod axis for a straight frontal headplate. The central ray is always perpendicular to the film-holding cassette.

The new stereocephalostat developed at Northwestern University departs somewhat from the fixed lateral and frontal convention (Fig. 3) in that it permits three-dimensional visualization at 1 degree intervals over an arc of 190 degrees in lateral or frontal vectors, but it, too, relies on ear rods for orientation of the head. Some devices use accessory orienting aids to indicate the anthropometric landmarks of nasion and orbitale. It is obvious that since the measurements taken and observations made concern bony landmarks and structures primarily, the positioning of the head by soft tissue structures—the ears—is not as precise as desired.

The limitations of the variability have been studied by Stackler and Dick.[12, 13]

12. Stackler, H. M. An evaluation of error in cephalometric roentgenography, introduced by variation in positioning of the head in the Broadbent-Bolton cephalometer. Masters' thesis, Northwestern University, 1948.

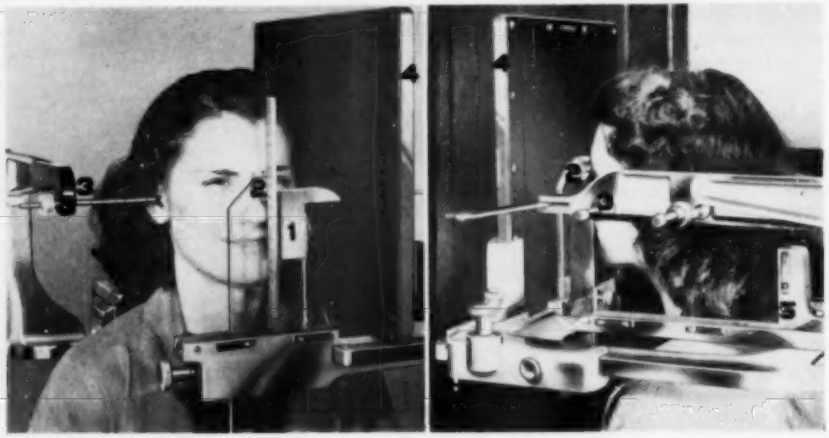


Fig. 1 • Broadbent-Bolton cephalometer. Patient is oriented by inserted ear rods and a nasion marker for lateral and frontal views. 1. Aluminum millimetric scale for profile measurements on lateral film; 2. Plastic nasion marker to maintain Frankfort horizontal posture; 3. Adjustable ear rods; 4. Film-holding cassette, lined with calcium tungstate intensifying screens; 5. Channel to hold cassette for lateral picture

They show this variability to be insignificant in routine clinical orthodontic analysis when standard cephalometric angular measurements are used on the lateral headplate. Linear measurements on the lateral headplate, or any measurement on the frontal headplate, are less accurate. Even with the 60 inch distance from the roentgen ray target to the midsagittal plane, magnification is still 5 to 8 per cent in the peripheral portions of the midline structures. Measurements of less than a millimeter are unreliable.

Despite the fact that there is an acceptable range in positioning the head in the headholder for lateral headplates, laxity is not to be condoned. The patient must be positioned carefully with the ear rods inserted firmly in the external auditory meatus. The patient literally "hangs by the ears," with the neck extended to its fullest. The shoulders thus assume a lower position and allow lower placement of the film-holding cassette to prevent cutting off the chin point on the film.

Other important technical factors are proper exposure and contrast of film, soft tissue visualization, the kilovolt peak, the milliamperage, target-film distance, size of focal spot, use of intensifying screens, Lysholm grid, type of cassette and developing. Thurow and Franklin[14, 15] discuss some of these factors in recent articles. Because of the limitations of this paper, only the major considerations can be outlined.

There must be a proper balance between the milliamperage (or the amount of electrical energy passing through the x-ray tube) and the kilovolt peak (or the quality of electrical energy passing through the tube; that is, the force pushing the current through the x-ray tube and across the gap between the cathode and the anode). The milliamperes are controlled by raising or lowering the tube filament temperature. If all other factors are constant, both the radiation dose in roentgens per unit time and the film effect are directly proportional to the milliamperes. Also, the relation between milliamperage and time is directly proportional. Thus the exposure for 20 milliamperes is half that required for 10 milliamperes. For x-ray tubes of the size and capacity of the ordinary dental machines, between 25 and 40 milliampere seconds are required for a good lateral

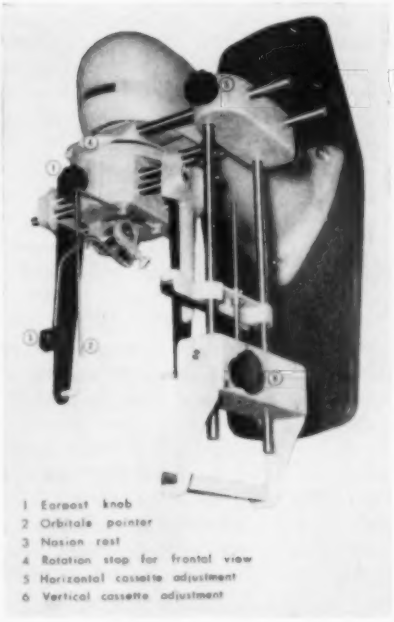


Fig. 2 • Thurow x-ray cephalostat. Both ear rods are moved to the midline by one adjustment, maintaining the distance constant between the midsaggital plane and the x-ray tube. Some positioners establish a constant target-film distance. Either the D-3 x-ray head as used with the Broadbent-Bolton cephalometer or the conventional dental machine with the D-2 x-ray head may be used

13. Dick, M. F. A study of the variability of cephalometric landmarks. Masters' thesis, Northwestern University, 1953.

14. Thurow, R. C. Cephalometric methods in research and private practice. Angle Orthodont. 21:104 April 1951.

15. Franklin, J. B. Certain factors of aberration to be considered in clinical cephalometric radiography. Am. J. Orthodont. 38:351 May 1952.

headplate, from 60 to 100 milliampere seconds are needed for an acceptable frontal view. These values are based on the use of moderate kilovolt peak readings of 50 to 60. To determine the exposure, the number of milliamperes delivered by the x-ray machine are multiplied by the number of seconds exposure. Recent technics permit the use of higher kilovolt peak values, with more powerful equipment. Milliamperage requirements are thus reduced.

The balance of milliamperage and kilovolt peak must allow reproduction of the images of bone and teeth, as well as the soft tissue profile outline. Particularly with the newer and more powerful sources of radiation such as the rotating anode equipment in use at Northwestern University, care must be exercised in maintaining this balance of milliampere-kilovolt peak and exposure time. Too high a kilovolt peak may mean a "graying" or blending of structures as the ability of penetration of the roentgen ray beam becomes greater. On the favorable side, as the kilovolt peak is increased, exposure time can be decreased as the film receives more radiation and the patient relatively less. This can be tabulated as follows:[16]

Kv.p.	Ma. seconds	Patient radiation	Film radiation
65	28	6.15 r	0.354 r
75	18	4.93 r	0.352 r
100	8	3.82 r	0.354 r

If the kilovolt peak reading is too low, penetration is inadequate and the resultant contrast too great.

Recent contributions to the literature have emphasized the dangers of radiation. This is of no concern in cephalometric roentgenography, inasmuch as a lateral headplate needs only the exposure required for an upper first molar view. By placing a 1 mm. thick aluminum filter over the source of radiation, however, the roentgens can be reduced further. At 65 kilovolt peak, 10 milliamperes and the usual exposure, patient radiation is reduced from 1.8 r to 1.37 r. At 90 kilovolt peak and 15 milliamperes, the 1 mm. aluminum filter reduces patient exposure from 1.1 r to .93 r. This reduction is ac-

16. Principles of dental x-ray generation. Milwaukee, General Electric technical manual, 1955.

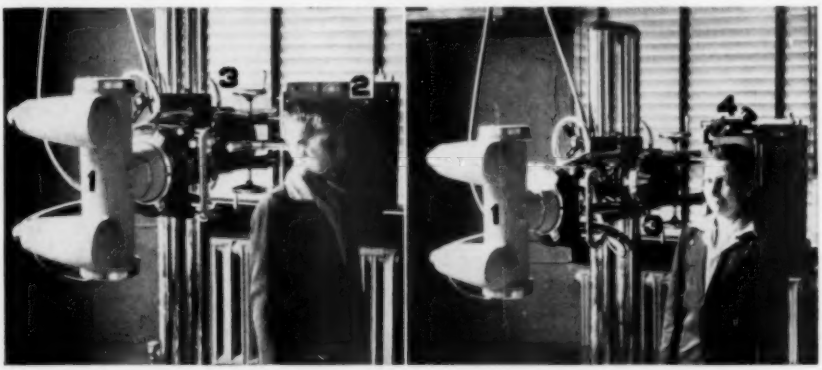


Fig. 3 • Northwestern stereocephalostat. Lateral or frontal views may be taken, with the patient lying down, sitting or standing, at 1 degree intervals over a 190 degree arc. 1. High speed, fine focus rotating anode head. 2. Lateral adapter. 3. Micro-set calibrating wheels. 4. Frontal adapter

complished by preventing the softer and relatively ineffectual rays from reaching the patient.

The longer the target-film distance, the less objectionable the peripheral magnification; however, the image loses some of its sharpness. For clinical cephalometrics in orthodontic diagnosis, this poses no real problem. Any distance from 42 inches to 60 inches is satisfactory. Since the exposure time varies as the square of the distance, a shorter target-film distance substantially reduces the exposure time and permits the use of less powerful equipment. The smaller the focal spot in the x-ray or Coolidge tube, the sharper the image; hence a dental machine with a D-2 type head is ideal in this respect. The film must be placed as close to the head as possible for maximum sharpness of the image. Proper placement of the film, a small focal spot and a reasonably long target-film distance keeps magnification, distortion and diffusion at a minimum.

Unfortunately, because of the demands of a fine grain orthochromatic film for roentgenographic work, the emulsion speed is relatively slow. This means that intensifying screens are necessary to make the exposure time short enough to minimize patient movement. Bristol board sheets, impregnated with calcium tungstate crystals, fit in the film-holding cassette on both sides of the film. These screens work by fluorescing as the radiation passes through them; thus the silver salts in the emulsion are activated by light as well as by roentgen radiation and the exposure time is reduced to approximately one sixth of that required without screens; however, the screens also reduce the sharpness of the picture (Fig. 4). The use of a Lysholm grid (fine ribbons of aluminum mounted very close together and parallel in a cardboard matrix) polarizes the radiation and improves definition of the image, but again lengthens the exposure time. This limits the use of the grid to more powerful equipment.

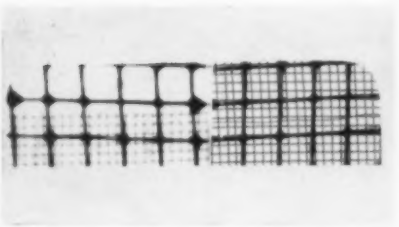


Fig. 4 • Roentgenogram of screen wire taken with and without calcium tungstate intensifying screens. Exposure time of image on the left is much shorter, but with a sacrifice in detail (Thurow)

Processing of the films is also an important factor, and unless it is given proper consideration, it can well be the weak link in the chain. Metal tanks are superior for temperature control, and temperature is an important constant. Routine developing by a time-temperature scale is to be preferred to the inspection method. The use of a red pigmented developing solution is recommended. This eliminates fogging hazard from light leaks during developing. Developing solutions are exhausted quickly—no more than 50 8 by 10 inch films should be developed per gallon, or the solution should be kept no longer than 2 to 3 weeks. The developing solution should be kept covered to reduce oxidation. The fixing solution can be used indefinitely, as long as the litmus test strips show its effectiveness. One of the most common errors is to wash films for too short a time. This seriously impairs the quality and life of the film image. If each film is wiped dry with a chamois, there is less likelihood of spotting or picking up of dust particles.

RELIABILITY OF LANDMARKS

It must not be forgotten, when making any interpretation from cephalometric roentgenograms, that the headplate compresses a three-dimensional subject into a flat plane. The limitations are obvious.

Fig. 5 • Cephalometric measurepoints that are more difficult to determine accurately in routine lateral headplates. (1) Bolton point; (2) basion; (3) porion; (4) pterygomaxillary fissure; (5) orbitale; (6) spheno-occipital synchondrosis; (7) gonion; (8) anterior nasal spine; (9) posterior nasal spine; (10) point A (subspinale)

Supra-imposition poses a real problem, particularly in the dental areas, the temporomandibular joint or any area where an attempt is being made to delineate paired structures. Proper attention to technical details will reduce the difficulty to a minimum, but the individual variation in structure and density makes supra-imposition a constant concern in interpretation. An excellent atlas on interpretation of roentgenograms of the head has been published by Epstein and Davidoff[17] and can be used to improve visualization of pertinent structures.

The first requisite of usable landmarks is that they be constant in position and outline, and that they be readily demonstrable to all observers. Many cephalometric technics have been developed in which landmarks are used that can be seen routinely by too few trained men. In this category are such landmarks as spheno-occipital synchondrosis, orbitale, porion, Bolton point, pterygomaxillary fissure, anterior nasal spine, posterior nasal spine, basion, gonion and point A. Dick's[13] research has shown the greatest variability in angles which utilized these points (Fig. 5).

One of the weaker points of the lateral cephalometric roentgenogram is the difficulty of seeing the temporomandibular joint properly. Supra-imposition of the orienting device itself, plus the density and complexity of the osseous structures mitigate against accuracy. The angle at which the picture is taken makes observation of the condylar profile difficult (Fig. 6, left). This can be improved by taking an open-mouth picture, (Fig. 6, right) using a template of the condyle from this picture and then drawing in the condyle in the physiologic rest and occlusion headplates. Use of a Lysholm grid over this area helps reduce the soft rays and secondary radiation. Research is now in progress at Northwestern University on methods to improve visualization of the actual condylar surface in three dimensions.[18]

MENSURATION

Proper orientation of the patient permits an accurate longitudinal appraisal of the changes induced by growth and therapy. Linear measurements are accurate only in structures close to the central ray. The peripheral areas are more magnified, particularly on the side of the patient away from the film. Mathematical correction tables have been developed by Adams[19] and others, and a mechanical device to aid in this respect is used by Wylie and Elsasser.[20] The magnification error is sufficiently small to be of little concern, and correction tables seldom are necessary. The problem of magnification and

17. Epstein, B. S., and Davidoff, L. M. An atlas of skull roentgenograms. Philadelphia, Lea & Febiger, 1953.

18. Posselt, U., and Graber, T. M. A new projection for study of condylar morphology. Unpublished research, Northwestern University, 1956.

19. Adams, J. W. Correction of error in cephalometric roentgenograms. Angle Orthodont. 10:3 Jan. 1940.

20. Wylie, W. L., and Johnson, E. L. Rapid evaluation of facial dysplasias in the vertical plane. Angle Orthodont. 22:165 July 1952.

the two-dimensionality of the projection make it desirable to use angular measurements wherever possible, however.

Measurements can be made on cephalometric roentgenograms, provided proper caution is exercised and the limitations are considered. Therefore, it is helpful to know what measurements are of the greatest value in diagnosing the malocclusion, in outlining the treatment plan, in prognosticating the results and in actually following the progress of orthodontic treatment.

Maxillary Growth • The major growth changes are in the tuberosity area and the alveolar process; the fewest in the nasal floor and anterior nasal spine area. To measure growth changes, superimposition of cephalometric tracings should be made on the least changeable structures; that is, the anterior nasal spine and the nasal floor. Unfortunately, the anterior nasal spine is hard to see roentgenographically and it is highly variable. The bone here is fairly radioparent. The posterior nasal spine is often impossible to discern because of the supra-imposition of the erupting posterior teeth (Fig. 5, 6). The nasal floor itself is not difficult to follow, even with frequent supra-impositions of the cuspid in the anterior portion. But with both nasal spines unreliable for serial study and with the pterygomaxillary fissure equally variable in outline, studies of maxillary growth by comparison of successive cephalometric tracings of the maxilla are of limited value.

Mandibular Growth • The major growth changes in the mandible during the course of orthodontic therapy are in the ramus, condyle and alveolar process. By superimposing tracings of successive cephalometric roentgenograms, using the mandibular symphysis as the constant area of superimposition, actual mandibular growth changes and treatment

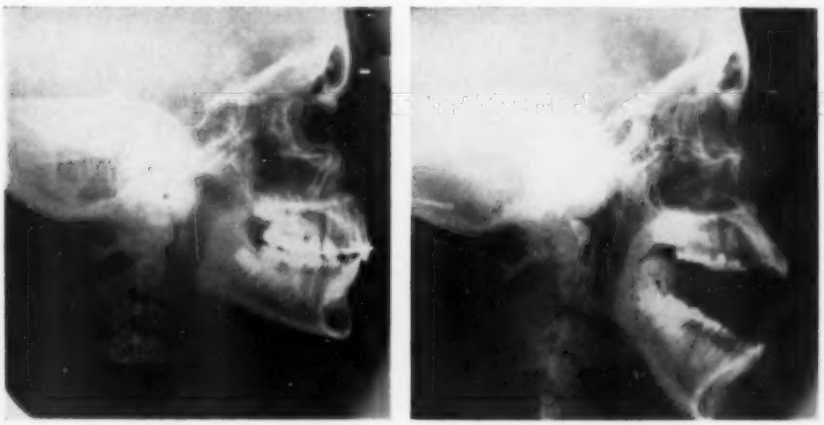


Fig. 6 • Lateral headplates with jaws in occlusion and open. Left: Condyles are difficult to see. Machine was not designed for temporomandibular joint pictures. Density and supra-imposition of anatomic structures plus machine registration reduce the reliability of the apparent image. The open-mouth picture takes advantage of the downward and forward movement of the condyles into a more favorable area. Even so, images are not true profile pictures, because the central ray does not pass through the long axis of the condylar cylinder, but at an angle of approximately 15 degrees to it. The opening movement may also distort correct head position.

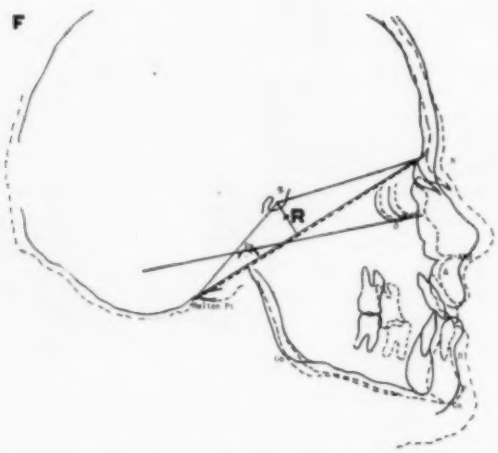


Fig. 7 • Serial tracings superimposing on R point, or registration point. This permits an appraisal of developmental and therapeutic changes

changes can be seen fairly well. The outline of the inferior border of the mandibular body reflects positional change, which makes it imperative that the positioning factor in successive roentgenographic examinations be kept as constant as possible.

Changes in the Maxilla and Mandible Induced by Growth and Development and by Orthodontic Treatment, With Respect to the Relatively Undisturbed Cranial Base • Good reliability of measurements and interpretation can be expected, either when the Broadbent technic of superimposing successive tracings is used, in which the registration point is utilized and the Bolton plane is kept parallel (Fig. 7), or when the center of sella turcica is used as a registration point and the anthropometric landmark nasion is allowed to move upward and forward (Fig. 8). Either method is valid over any reasonable period of orthodontic management, although the Broadbent technic is preferred for growth studies which cover long periods of time.

One of the most important considerations in orthodontic treatment for Class II and Class III malocclusions is the anteroposterior relation of the maxillary and mandibular bases. The apical base relation is an all-important prognostic clue. The method developed by Downs of using arbitrary measurepoints A in the maxilla and B in the mandible to denote basal areas and apical base relations is most widely accepted.[21] The cephalometric analysis made at Northwestern University utilizes the Downs' points, A and B.[1] Despite the importance of basal relationship, the establishment of these measure points is not as precise as it should be (Fig. 5). Point A often is burned out in the roentgenogram, or obscured because of bony and soft tissue supra-imposition (Fig. 5, 6). Although in theory these points should fall at the apex of the upper and lower incisor teeth, they seldom do. They usually are estab-

21. Downs, W. B. Variations in facial relationships; their significance in treatment and prognosis. Am. J. Orthodont. 34:812 Oct. 1948.

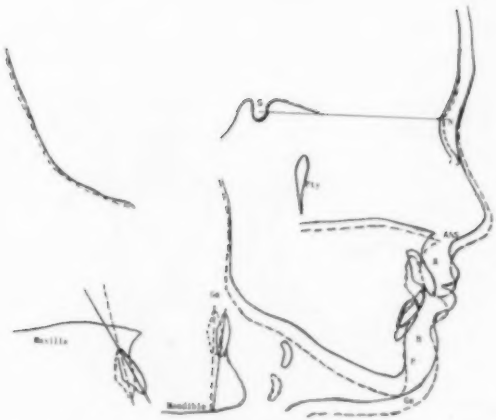


Fig. 8 • Serial tracings superimposing on sella turcica and the SN plane. Note forward movement of nasion

lished somewhere along the apical third of the root instead. The value of the information gained makes the use of these points imperative, despite the variability. Fortunately, the determination of angular values through use of the anthropometric landmark nasion above reduces the significance of the error (Fig. 9).

Changes in the Dentition Induced by Orthodontic Procedures • Tooth changes are difficult to see at times because of the supra-imposition of images of the right and left sides. Difficulties are encountered in the incisor area particularly, where as many as six teeth are "zero-ed in," one on top of the other (Fig. 10). A thorough knowledge of dental anatomy is needed to construct the lingual surfaces of the incisors. This is often true even for the labial surfaces; the apical portion is seldom clear or is not discernible at all. For this reason, the decision in orthodontic therapy to extract or not to extract on the basis of the lower incisor inclination to either a variable mandibular plane or a more variable Frankfort horizontal plane should be made with caution (Fig. 9). Molars and bicuspids seldom are easy to trace in, though the process is much easier for a competent observer. In some quarters, this is referred to as "scientific guessing." In picking up teeth, particularly for the determination of axial inclination, it is of some advantage to use the pulp chambers as guides for the root portions.

RELIABILITY OF CLINICAL CEPHALOMETRIC CRITERIA

Since cephalometric criteria deal with physiologic media, they are only relatively accurate. Certain criteria are more reliable than others, though, and it is wise to choose those which can give consistently the information desired in orthodontic case analysis. Criteria that are theoretically superior, but which pose practical problems of visualization and measurement, should not be used by the orthodontic clinician. The planes used in cephalometric roentgenography will be discussed first.

The Frankfort horizontal plane (Fig. 11) is constructed by joining the machine

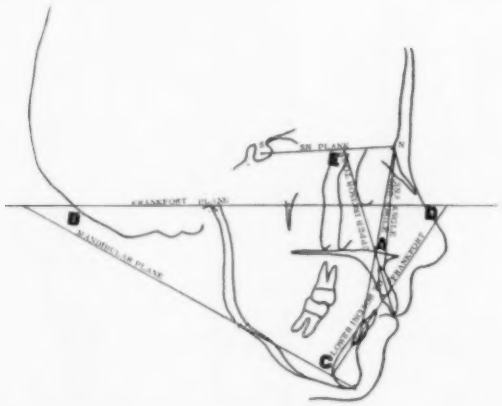


Fig. 9 • Cephalometric tracing illustrating some of the more common angular values. A. SNA-SNB difference (apical base appraisal). B. Frankfort mandibular plane angle. C. Lower incisor to mandibular plane angle. D. Lower incisor to Frankfort plane angle. E. Upper incisor to SN plane angle

registration of porion (the roentgenographic image of the ear rods) and the roentgenographic image of the lowest point on the inferior margin of the orbit. Both terminal points are variable. One of the landmarks that is most difficult for beginning students of cephalometrics to locate accurately seems to be orbitale. Bony supra-impositions, slight changes in head positioning, differentiation between left and right orbits, relatively slight gradation in radiolucency from bone of surrounding structures—all these mitigate against accuracy for the average observer. The position of porion depends on the way the ear rod is inserted into the ear, a soft tissue structure. Variation can be rather marked from patient to patient, from examination to examination.

The Bolton plane is theoretically the best cranial plane to divide the cranium from the facial structures (Fig. 11). When experts use it for growth studies, it has no peer. In clinical analysis associated with actual orthodontic treatment, however, it is hard to see at times, with the Bolton point, the posterior terminus, becoming progressively more difficult to establish as the child grows older and as the mastoid air cells proliferate downward. Dick[13] showed consistent variability among trained observers in locating the Bolton point.

The sella-nasion plane is perhaps not as true a dividing line between cranial and facial structures, though it does approximate the floor of the anterior cranial fossa; nevertheless, it is most constantly traced. It cannot be denied that it may alter its inclination slightly over the growth span from infancy to adulthood. For the orthodontic clinician who is interested at most in a three to four year period during actual treatment, this is of minor concern. The anthropometric landmark nasion is sometimes difficult to see where the notching is absent between frontal and nasal bones, or when the radiolucency of both bones is constant. Ordinarily, the nasal bone is relatively radioparent. The posterior terminus of the sella-nasion plane is easy to trace in profile outline. There is little variance among observers arbitrarily picking the

center. Occasionally, the hypophyseal fossa is elongated vertically which creates some difficulty in establishing the center point.

The maxillary plane is not difficult to see, despite the nebulous positioning of anterior and posterior nasal spines, because of the sharp line of the nasal floor. The cuspid bulge is ignored in younger patients (Fig. 11). The maxillary plane is a constant plane, paralleling the Frankfort horizontal plane. Personally I construct an arbitrary Frankfort horizontal plane, when needed, at the level of the orbits by drawing a parallel to the maxillary plane. This is fairly valid and more accurate than the conventional method of drawing in the Frankfort horizontal plane.

The occlusal plane is really not a plane but a curve. It is difficult to bisect the molar and incisor overbite. Despite these drawbacks, the occlusal plane is an excellent reference plane for measuring changes induced by orthodontics, in a region of vital concern to the orthodontist.

The mandibular plane, unfortunately, is rather variable, despite the need for a reliable plane in this area. One method of establishing the plane is to draw a tangent to the lower border of the mandibular body. In some instances this is easy, but in many, the lower border is not straight but curved, which leaves a broad range of possible tangents. The alternative method of drawing the plane through the anthropometric landmarks gonion and gnathion is no better because of the variability in establishing both landmarks, particularly gonion (Fig. 11). Since gnathion is a midline point and gonion is not, and since gonion is variable

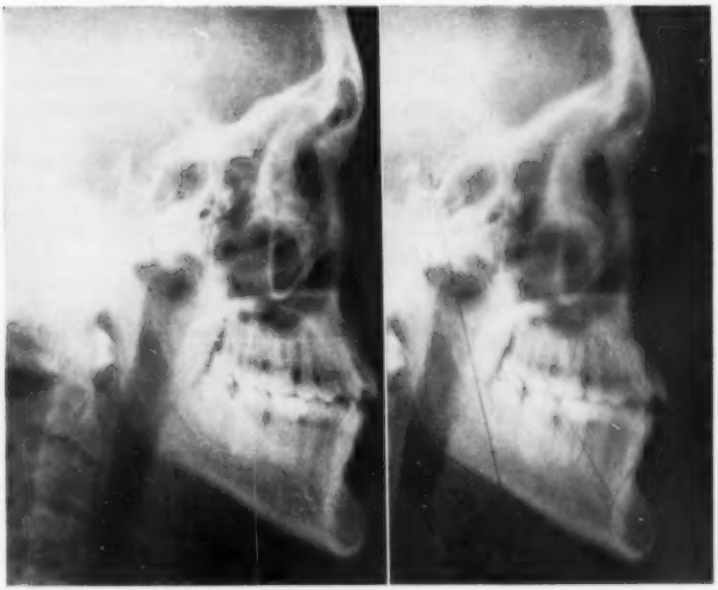


Fig. 10 • Note lower anterior segment is fairly flat, so that images of six anterior teeth are superimposed. Headplate on the left is untraced; headplate on the right has salient structures traced in

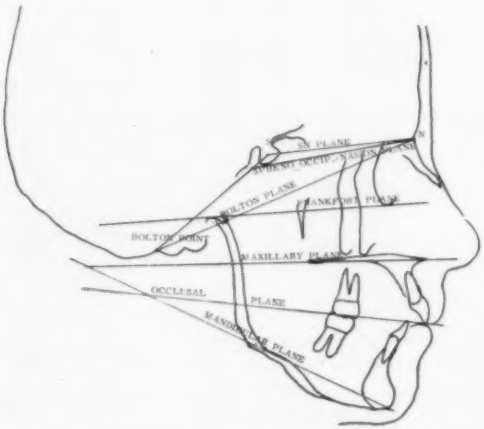


Fig. 11 • Cephalometric tracing of lateral headplate, showing various cranial and facial planes used in cephalometric analysis. The S-N plane, spheno-occipital synchondrosis-nasion plane, Bolton plane and Frankfort plane serve as base planes, with the first three being in the neurocranium. The maxillary, occlusal and mandibular planes of the visceral cranium, or facial portion, are of direct concern to the orthodontist

and may show further change in position with the varying position of the patient's head, it is the opinion of some observers that a more accurate midsaggital plane landmark can be obtained that would do away with positional variation by marking both left and right gonial points and then taking a midpoint between them. As to which is the better method of constructing the mandibular plane—a tangent to the lower border or the GoGn plane—personal preference must determine the method employed; both methods are limited in accuracy.

An appraisal of the angular measurements used by orthodontists in cephalometrics requires complete objectivity. The Frankfort-mandibular plane angle is one of the most highly regarded criteria of diagnosis for many clinicians. Is it reliable? The Frankfort horizontal plane is variable, as shown previously; the mandibular plane is also variable. The inevitable conclusion is that two variables hardly permit positive deductions. The value of the Frankfort-mandibular plane angle as "an infallible criterion of the severity of Class II, Division 1 malocclusions" has been further questioned as a result of the observations made in a study completed at Northwestern University of 150 Class II, Division 1 malocclusions. A statistical appraisal showed no significant relationship between mandibular plane angle and the anteroposterior apical base relationship.

Closely akin to this is the angle of the long axis of the mandibular incisor to the mandibular plane. It has already been pointed out that the mandibular incisor shape is often difficult to draw because of supra-imposition. The mandibular plane is variable. It is somewhat presumptuous for an orthodontist to make diagnoses on fractions of a degree, or to discuss the moving of a tooth 2 to 3 degrees, or extract lower first bicuspid teeth because the mandibular incisor is "plus

4" with a high mandibular plane angle. This empiricism is the basis of orthodontic thinking and mechanotherapy among many orthodontists today. Can they do it? Do they do it? Are they fooling themselves or the patient? It is admirable and desirable to be precise, but this is rather difficult with imprecise tools, and physiology has a habit of dodging mathematics. With all the emphasis in the literature on the importance of the inclination of the lower incisors, it has not been pointed out that the axial inclination of the maxillary incisors when measured to a dependable cranial base plane is more reliable. The maxillary incisor inclination deviates less statistically than the mandibular incisor inclination despite all the local factors operating on the maxillary incisors to make their position more variable (Fig. 9).

The mandibular incisor to the Frankfort plane (Fig. 9) as a cephalometric criterion is subject to the same limitations as is the inclination of the mandibular incisor to the mandibular plane. The Frankfort plane is perhaps even more variable than the mandibular plane. If the inclination of the mandibular incisor seems important in orthodontic diagnosis, it would appear feasible to project the long axis of this tooth upward, out of the face, until it intersects a dependable cranial base plane, for example, the sella-nasion plane. A statistical appraisal of 100 patients with clinically excellent occlusion shows the angle formed by the long axis of the mandibular incisor and the sella-nasion cranial base plane to be less variable. This might be more nearly a measure of change of position of the incisor in the face, not a measure of growth and development, and of error in patient positioning, and thus be subject to greater technical limitations.

The angle sella-nasion-point A (SNA) (Fig. 9) is an excellent orthodontic diagnostic criterion, within limitations. Point A is hard to see at times; the contour of the profile curvature of the alveolar and basal bone from the alveolar crest superiorly to the anterior nasal spine shows great variability from patient to patient. Fortunately, the danger of making Point A an arbitrary terminus of the angle and the chance of error are reduced because the anthropometric landmark is directly above Point A. The line NA will change little in its inclination to the SN plane even though Point A moves up or down 2 to 3 mm. This criterion shows the position of the maxilla with respect to the cranium. It is also an indication of facial type. The stability of the ultimate inclination of the incisor teeth depends to a large extent on whether the maxilla is protracted or retracted. A prognathic face tolerates greater incisor procumbency. A retrognathic face demands more vertical incisor inclination.[11]

The angle sella-nasion-point B (SNB) (Fig. 9) is an easier angle to see and draw and is more dependable. It is vitally important for the orthodontist to know the anterior basal limit of the mandibular denture.

The SNA-SNB difference is more important than either angle by itself. It is a truer measure of anteroposterior apical base relations, and perhaps is more important than any single criterion in predicting the limitations and ultimate orthodontic results in Class II and Class III malocclusions (Fig. 12).

The angle of facial convexity (NAP) (Fig. 13) is not too difficult to measure, though Point A has limited reliability. The information gained means little by itself and adds little when other criteria are used. It could be eliminated from most cephalometric analyses without much loss.

The facial angle—Frankfort horizontal plane (NP) (Fig. 13) provides a measure of the severity of Class II and Class III malocclusions and thereby establishes the position of the mandible with respect to a basal plane and a cranial landmark. Because of the broad variation in the shape of the mandibular symphysis,

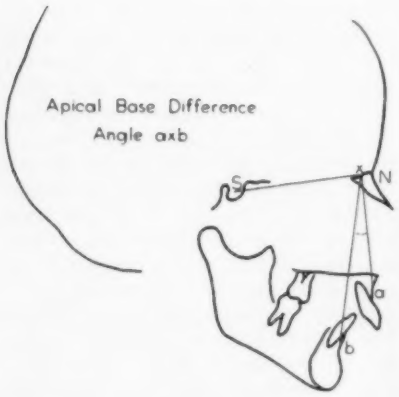


Fig. 12 • Cephalometric tracing showing one method of determining anteroposterior maxillomandibular basal difference, developed by Freeman and Rasmusson. The line Ax is perpendicular to the cranial base plane SN, and not dependent on the position of nasion. This cephalometric criterion is of greatest importance in Class II and Class III malocclusions

the angle occasionally can be misleading. A further limitation is the variability of the Frankfort horizontal plane.

The Y axis angle (Fig. 13) is easy to construct and is easily reproducible. For longitudinal or serial studies, it provides an indication of the downward and forward mandibular growth. It does not necessarily predict the direction of growth, and can change for the better or the worse.

The AB-NP angle (Fig. 13) is an excellent criterion and most important in the analysis of Class II malocclusions. The information gained is similar to the SNA-SNB difference and only one of these criteria need be used. The AB-NP angle, like the facial angle, is subject to morphologic variation and changes in position of the chin point (Point B).

DISCUSSION

It was pointed out in the opening discussion that there has been a tendency to over-simplify the interpretation of cephalometric data by comparing the criteria measured to a set of so-called "norms." This can be misleading. Simon[22] sagely observed,

> Anomalies are found everywhere . . . hence there must also be a normal. But this, alas, is a delusion—all we ever find are variations, endless variations; an exact, ideal norm does not exist, cannot exist. And this is our enigma; in theory we will never find the normal, in practice we forever feel its need and apply it constantly. . . . After we fully understand the constitutional and environmental influences that form the individual denture; which of these are helpful and which are injurious; which of these may be altered and which are unchangeable—then the fiction of the conception of a normal will of itself become historically useless.

In a study of so-called clinically excellent occlusions, there is a broad range of facial types, anteroposterior apical base differences and incisor tooth inclinations. All are normal. Measurements at one end of the range are just as normal for one individual as measurements at the other end of the range are for another. These measurements are not interchangeable among the so-called normal individuals spread across the range, however. When this idea is considered in connection with the diagnostic criterion that has been most widely discussed in orthodontic literature—the axial inclination of the mandibular incisor to the mandibular plane—it is apparent how absurd arbitrary inclinations are as therapeutic goals in routine orthodontic treatment.

In a statistical analysis of a large group of individuals with clinically excellent occlusion, the standard deviation of the angle formed by the long axis of the lower incisor with the mandibular plane is 6.78 degrees. The mean is 91.92 degrees. Employment of the most fundamental biometric theory will show that an angular reading anywhere between 85.14

22. Simon, P. W. Fundamental principles of a systematic diagnosis of dental anomalies. Translated by B. E. Lischer. Boston, Stretford Co., 1926.

degrees and 98.70 degrees (plus or minus one standard deviation) will include only two thirds of persons with normal occlusions. There is one chance in three of the cephalometric criterion being abnormal in this range. Only when the angular value is outside two standard deviations—or outside the range of 78.26 degrees to 105.48 degrees is there reasonable certainty that the value is abnormal, and then this includes only 95 per cent of the normal types.

Facial type, or more accurately position of the maxilla and mandible with respect to each other and to the cranium, does much to determine what is "normal" for a particular individual. A larger apical base difference and more procumbent incisor teeth are tolerated and expected in individuals with protracted maxillas—or where the maxilla is anteriorly positioned in its relation to the cranium.

Finally, it must be recognized that clinical cephalometric analyses are static. They appraise the dentofacial morphology at the time of the analysis. The important contributions of growth and development during the course of orthodontic therapy, and their utilization by mechanical appliances, cannot be reliably predicted as yet. This is of greatest significance in the correction of Class II, Division 1 malocclusions. If treatment is during the pubertal growth spurt, the choice of appliances may be strictly secondary. Noticeable apical base changes (AB difference) are observed routinely in "before and after" cephalometric analyses.[7, 23, 24] (Fig. 14).

SUMMARY

In summary, certain observations can be made.

1. A thorough knowledge of technical details is a prerequisite for uniformly good pictures. Magnification, distortion

23. Graber, T. M. Extraoral force—facts and fallacies. Am. J. Orthodont. 41:490 July 1955.

24. Lundstrom, A. The significance of genetic and non-genetic factors in the profile of the facial skeleton. Am. J. Orthodont. 41:910 Dec. 1955.

Fig. 13 • Cephalometric tracing after Downs, showing skeletal criteria of appraisal. 1. Facial angle (FH-NP). 2. Angle of convexity (N-A-P). 3. FH-mandibular plane angle. 4. Growth axis (Y axis). 5. Apical base relationship (AB-NP).

Fig. 14 • Lateral cephalometric roentgenograms, Class II, Division I malocclusion, taken before and after treatment. Apical base change is significant

and diffusion are problems that are inherent in the roentgenology; they must be reduced to a minimum and be balanced. Other factors such as positioning the patient properly, eliminating patient movement and getting proper film contrast through proper exposure and developing and balancing of kilovolt peak and milliamperage factors are important.

2. Certain landmarks are more reliable than others and these should be the cephalometric measure points of choice.

3. Measurement of cephalometric roentgenograms must be done with the greatest accuracy by using angular criteria primarily, keeping linear measurements at a minimum. Structures closest to the central ray are measurable with the greatest accuracy. Some of the entities the orthodontist would like to measure cannot be measured with accuracy; for example, maxillary growth. Variability of one or more terminal points in any cephalometric analysis criterion mitigates against accuracy.

4. The most important and reliable of clinical cephalometric criteria are measurements assessing the anteroposterior apical base difference, facial type, tooth inclination and changes induced by orthodontic therapy and growth and developmental contributions during therapy. There are no neat little pigeonholes in which to place the information, or from which to procure the information. Cephalometrics is only a diagnostic aid. The patient is still the most important source of information. To the orthodontist, plaster models remain the most important single criterion.

The Beginning of Scientific Work • When a scientific discovery or invention has been brought to some practical application, the work of the scientists is not finished, it has only just begun. ***H. A. Spoehr, Nature of Progress in Science.***

Cases and Comments

DENTINOGENESIS IMPERFECTA

By George W. Walter, D.D.S., San Diego.

The patient, an 18 year old man, appeared to be normal. His Navy medical records revealed no significant deviations.

During a routine roentgenographic examination, an unusual root form was noted. Periapical roentgenograms showed an almost complete obliteration of pulp chambers and root canals (illustration). The crowns of the teeth were normal in contour. Most of the roots had a greater diameter in the middle third than at the cementodentinal junction. Radiolucent areas were noted around the apexes of the right maxillary first bicuspid, the left mandibular lateral incisor and the left mandibular first bicuspid. Of these teeth, only the right first maxillary bicuspid was carious. It seemed possible, therefore, that these regions were sterile.

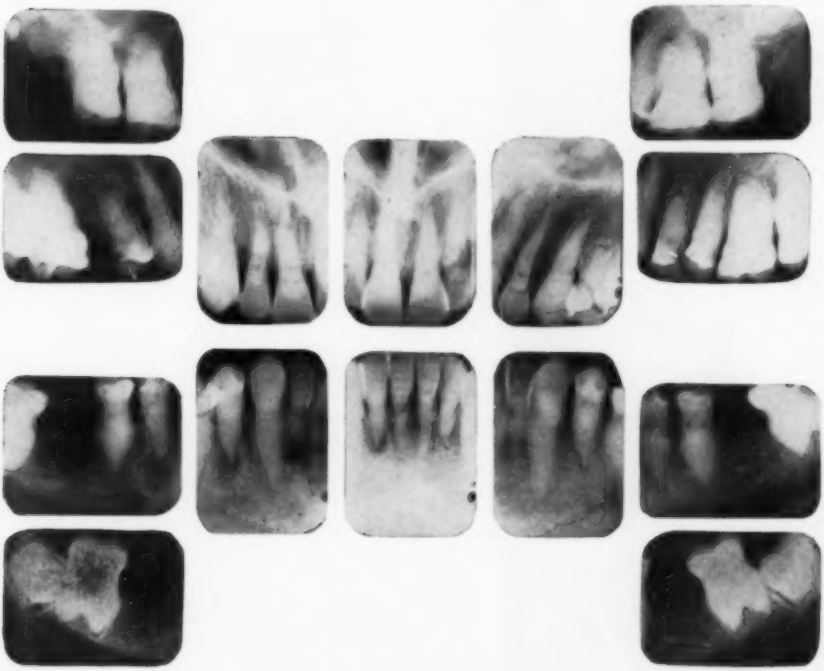
The crowns were of reasonably normal color and contour. Practically no calculus or food debris was noted.

Similar cases have been reported in the literature, but in these instances the color of the crowns was not normal. Family history revealed that other members had the same condition.

A diagnosis of hereditary dentinogenesis imperfecta was made based on the observations described. The etiologic factor involved is not known except that heredity seems to play a role.

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Commander, Dental Corps, U. S. Naval Training Center.



Roentgenograms reveal almost complete obliteration of pulp chambers and root canals

MOUTH RECONSTRUCTION PREVIEWS

By A. F. Schopper, D.D.S., Kansas City, Mo.

Few patients with badly broken down mouths and lost vertical dimension can visualize the improvement in their appearances and masticatory functions promised by good dentistry. In some instances, it is difficult for the dentist to visualize the full possibilities of the services he proposes to render. To help both the patient and the dentist to preview the esthetics, comfort and efficiency of the proposed restoration, the use of acrylic resin veneer previews are recommended. A step-by-step description of the technic is as follows:

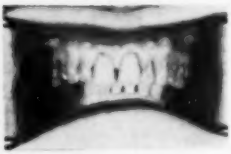


Fig. 1 • Photographs of the patient at rest and the patient's mouth are taken before the operation.

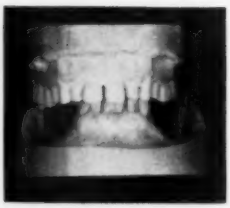


Fig. 2 • Study casts, made with the aid of a face-bow, are mounted on an articulator.

Fig. 3 • An occlusal plane which is in harmony with the patient's condylar movement is established, and bite-blocks called "skids" for the posterior teeth are constructed of self-curing acrylic resin. These skids maintain the corrected vertical dimension throughout all excursions of the mandible.

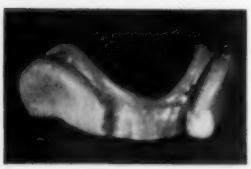


Fig. 4 • A typical bite-block or "skid" for the patient with bilateral loss of lower posterior teeth and severe abrasion of lower anterior teeth is shown in Figure 4.

Fig. 5 • The skids are placed in position on the model, and acrylic resin veneer slip-ons are constructed for the anterior teeth which are to be reconditioned or restored. These slip-ons must be correctly shaped and shaded in order to give the patient and the dentist an exact preview of the completed restorations.

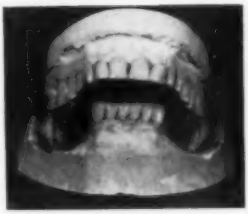


Fig. 6 • Typical upper and lower acrylic resin veneer slip-ons are shown in Figure 6.

Fig. 7 • After the skids and slip-ons have been checked on the model, they are placed in the mouth and the patient is instructed to move the jaws from side to side. If necessary, the occlusal planes of the skids are adjusted until they register the corrected vertical dimension throughout all excursions of the mandible. The slip-ons are adjusted on the anterior teeth. After the patient is satisfied with the newly established vertical dimension and both patient and dentist are satisfied with the improved appearance, actual construction of the restoration is begun. The skids are used as a guide in the construction of the permanent restoration.

Fig. 8 • Photographs of the patient at rest and smiling are taken after the operation for comparison with the preconstruction picture. In those instances in which the dentist is required to reconstruct a badly broken down, neglected mouth it is always advisable to provide the patient with an easily constructed preview of the finished restoration.

914 Professional Building

COUNCIL ON DENTAL TRADE AND LABORATORY RELATIONS

Why public relations

The American Dental Association recognizes that the ancillary services provided by dental laboratory technicians and commercial dental laboratories assist the members of the dental profession in satisfying the increasing public demand for dental health care. The Association also recognizes that members of the dental profession have an ethical and a legal responsibility to safeguard the health of their patients by not delegating professional types of services to ancillary personnel. Recognition of these two facts is stressed pointedly by the Canadian Dental Association in a recent pamphlet entitled *Why Public Relations.* This pamphlet contains some interesting comments on the relationship between the Canadian dentist and his dental laboratory technician and commercial dental laboratory. The Council appreciates the courtesy of the Canadian Dental Association in permitting THE JOURNAL to reprint this timely article as a Council report.

W. E. Dundon, chairman, Council on Dental Trade and Laboratory Relations

No part of dental service has given more cause for concern during recent years than that of prosthetics. On many occasions it has been said that dentists themselves are fundamentally to blame for all the troubles existing today in this field of service. Others have said that dentists cannot realize what they are doing or they would desist from their detrimental actions.

IMMEDIATE DENTURES

Complaints by the public relating to immediate denture service are perhaps greater in number than for any other single service rendered in the dental office. The vast majority of these complaints arise when the denture requires re-basing. The complaining patient states that the fee assessed is not justified. Quite obviously a lack of understanding exists relating back to the initial service. Naturally the patient has a right to expect to be taken care of. Two methods are open. Either the dentist should include the re-basing fee in the initial contract or explain carefully to the patient that re-basing will be necessary for which a fee will be charged. A little time spent on patient education will pay large dividends and create good public relations.

EMERGENCY SERVICE

An aching tooth is not the only situation which creates a need for emergency services. Recently a man of some importance arrived in one of our large cities to keep a speaking engagement and upon his arrival an anterior tooth came off his denture. This minor incident, but of great importance to the individual, caused considerable adverse publicity for the profession in the newspapers. Several dental societies have now established an emergency service for nights, holidays and week-ends by means of a telephone number. At least one dentist must be on call at any specified time. Any such ar-

rangement anticipates public need and results in appreciation of professional service.

THE DENTAL LABORATORY

The cooperative attitude of the ethical technician is greatly appreciated. His position often becomes most difficult particularly when a dentist requests him to do what he knows he should not do. If he refuses he is likely to lose a customer. From evidence it is known that there are dentists who direct patients to laboratories for repairs. What can they expect the patient to do next time? Cases have been reported where dentists have sent patients to laboratories for matching teeth, trying in partial dentures, or correcting impressions. Is it surprising that some technicians get ideas about practicing dentistry? Such acts are undoubtedly due to carelessness or without thought of the future and confined to a small number of dentists. However, the effect is not lessened because there exists evidence in abundance of the end results.

In several provinces, during the last few years, strenuous efforts have been made by certain technicians to obtain legislation permitting them to practice prosthetic dentistry directly for the public. Through various media these technicians have secured considerable support among the public and hence the legislators. In the meantime, with such legislative activity and the resulting publicity, illegal practice has increased greatly in these provinces. Members of the profession in these areas now realize what can happen when some dentists are careless in their relationship with the dental laboratories. Great difficulty is experienced in opposing such legislation, particularly after some degree of public support has been exhibited.

Technicians causing this disturbance constitute a minority group. Their activities are embarrassing to the vast majority of technicians, who feel that their good name is being ruined. Ethical technicians express admirable support of the dental profession in refuting such activities and only request that dentists cooperate in not requesting them to do what they know to be illegal.

These are facts relating to the present situation. Little supposition is required to predict the future unless change is effected. Perhaps the most brilliant man the profession has ever had in the legal field said a few years ago that 99 per cent of legislative trouble in the dental field is initiated by dentists themselves. Whether or not this statement be wholly true makes little difference. The profession is faced now with a critical situation. Unless carelessness on the part of the dentists in their relationship to dental laboratories ceases, an even more serious situation in respect to legislation will undoubtedly be reached.

LABORATORY PRICES

At times members of the profession are critical of prices charged by the laboratories. Before criticizing, certain facts should be considered. The laboratory owner has been going through a difficult period financially. In order to produce satisfactory work he must employ capable technicians. In order to obtain or hold such employees he is in competition with skilled workers in industry. Certain audited statements have been made known to us. Skilled technicians in dental laboratories have been paid a larger sum than the owner profited during the year's operation. As a profession, dentistry must stand for fair dealing at all times.

Two alternatives are open to the laboratory owner, neither of which has he any desire to follow. First, he could engage a cheaper type of employee which in the end would result in an inferior service to the profession. Secondly, he could "practice a little on the side." Of course either of these methods would permit reduction of prices to dentists. The first is easily

understood but the second creates a paradox not understandable. Reliable information has been made available that in certain areas dentists patronize dental laboratories, known to be carrying on illegally, in order to secure lower charges. How ridiculous can professional men become?

WHAT ARE THE CAUSES?

It should be apparent to every dentist that a problem exists which requires attention. Representative organizations can only be effective with the cooperation of members. Experience has shown that members become really interested only when a crisis arises. The treatment calls for preventive measures in the procedure followed in each dental office.

WHAT CAN BE DONE?

Unwittingly, the individual dentist, who neglects his obligations, contributes to the problem greatly. These detrimental actions are performed by: (1) the dentist who has his patients deal directly with the dental laboratory or dental technician in any way; (2) the dentist who does not supply complete instructions to the dental technician; (3) the dentist who leaves to auxiliary personnel the design of a case or selection of materials; (4) the dentist who requests dental laboratory personnel to see a patient; (5) the dentist who refers a patient to a dental laboratory for any service whatsoever; (6) the dentist who is unwilling to assume professional responsibility for personally treating a patient; (7) the dentist who attempts to avoid paying just and reasonable laboratory charges.

All these are primary causes.

The majority of dental technicians are motivated by high ethical standards. The dentist and the dental technician cooperate in providing a health service for the public. The individual dentist, in his day to day relationships, should acknowledge high-level ethical cooperation. If the individual dentist neglects these important considerations in his daily contacts and in his daily practice, he shares in the responsibility for weakening his professional status and the health service which his profession is dedicated to render for the public.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Survey of patient-to-dentist travel

Annually since 1953 the Bureau of Economic Research and Statistics has published a booklet entitled *Distribution of Dentists in the United States by State, Region, District and County*. The districts and regions used in this publication were originally developed by the U. S. Public Health Service for the purpose of studying the distribution of hospitals. Districts are groups of counties, and regions are groups of districts.

The purpose of arranging counties into districts is to establish geographic units the boundaries of which are crossed relatively seldom by persons traveling to obtain dental care. Obviously, this goal can be achieved simply by making districts very large, that is, composed of many counties. Very large districts, however, would be of little help in studying the distribution of dental services, because a dentist located in one part of such a district could be a prohibitive distance from some of the population of the same district.

It is apparent, then, that two criteria must be used in judging the appropriateness of any districts used in studying the distribution of dentists: (1) district boundaries must be crossed relatively seldom by persons traveling to obtain dental care and (2) the districts must be relatively small and compact. Stated another way, two variables must be maximized: (1) per cent of patients seeing a dentist within their own district and (2) number of districts.

Approximately three fourths of all dental patients obtain their dental care within the municipality in which they live. The distribution of dentists is little or no problem with respect to this group of patients. The remaining one fourth of dental patients travel either from their farm or from their town to another municipality. Any discussion of patient-to-dentist travel or the maldistribution of dentists relates almost entirely to this one fourth of dental patients.

County lines are largely ignored by residents of farms and villages who travel to obtain dental care or other services and products. Probably there is some small tendency for people living within a county to obtain their dental care within that county even when dental care is equally close and available in another county. Residents of a county are sometimes required to travel to the county seat in connection with governmental matters; some of these people will obtain their dental care and do their shopping in the county seat because they are required to be there for other purposes, even though dental care may be available at a nearer town in another county. This influence is considered to be small, however, and the county line is believed to be of minor importance as a determinant of patient-to-dentist travel.

PURPOSE AND METHODOLOGY OF THE STUDY

The purpose of the present study is to test the validity of the districts used in the annual presentation of the distribution of dentists, and to determine whether any other existing trading area system would be more suitable for use in presenting the distribution of dentists. An attempt will also be made to determine whether a new system of dental service areas should be established by a nation-wide survey similar to the present pilot survey.

In this survey, questionnaires were sent to all dentists in three states: Colorado, Michigan and Tennessee. These

three states were considered to be closely representative of the entire United States with respect to economic factors related to dental care.

Each dentist was asked to record the names of the towns from which his patients came during the course of a week, and to tally the number of patients coming from each town.

Eleven hundred usable questionnaires were returned, representing about 22 per cent of the active dentists in these three states. No bias, in the statistical sense of the term, is believed to have resulted from nonresponse in this survey. There seems to be no possible relationship between the propensity of dentists to respond (or not to respond) and the distance traveled by dentists' patients. On the other hand, this is the type of study in which sampling does not serve particularly well, and the incompleteness of data incurred by nonresponse means that currents of patient-to-dentist travel cannot be perfectly delineated.

The 1,100 dentists reported treating a total of 63,072 patients during the week, for an average of 57.3 patients per dentist.

COUNTY AS BASIS FOR REPORTING DISTRIBUTION OF DENTISTS

The fact that county lines are not a strong determinant of patient-to-dentist travel does not mean that the county is useless as a basis for studying the distribution of dentists. Although the county line seldom acts as an impediment, it happens that for most people the nearest dentist is located in the same county as they are. For each county from which five or more dentists reported, the percentage of patients coming from the dentists' own county is shown in Table 1. It will be noted that these percentages are high for all counties listed. The percentages for counties not listed by name (less than five dentists reporting) are only slightly lower. For all Colorado counties, 89.4 per cent of the patients were from the dentists' own county; for Michigan counties, 90.2 per cent, for Tennessee counties, 88.4 per cent.

The similarity of the percentages of patients from the dentists' own county in the three states is rather surprising since no attempt was made in the survey to select states with counties of similar size. Indeed, the Kruskal-Wallis "H" test (non-parametric analysis of variance) indicated that there was no significant difference in the percentage of patients from the dentists' county among the three states.

With approximately 90 per cent of the patients going to a dentist in their own county, it is apparent that the county is a suitable unit for study of the distribution of dentists. This is particularly true in view of the fact that relevant economic statistics are available by county, such as per capita income, retail sales and population.

VALIDITY OF DISTRICTS

The districts developed by the U. S. Public Health Service and used by the Bureau in its annual presentation of the distribution of dentists was found to be a definite aid in the study of the distribution of dentists. Whereas 89.8 per cent of the 63,072 patients saw a dentist within their own county, 94.0 per cent of the patients saw a dentist within their own district. The percentage of patients from the dentists' own district was 94.7 in Colorado, 94.1 in Michigan and 92.8 in Tennessee (Table 2). Only about half as many people crossed district boundaries for dental care as crossed county boundaries. With only 6.0 per cent of dental patients crossing district boundaries to obtain dental care, the population-dentist ratio for a district is a highly sensitive indicator of the need for dentists.

The Bureau studied all other systems of trading areas or economic areas to de-

Table 1 • Per cent of patients from dentists' own county, for counties in Colorado, Michigan and Tennessee

Dentists' state and county*	Per cent of patients from dentists' county	Other counties from which more than 3 per cent of patients came
Colorado		
Arapahoe	85.8	Denver, 11.0
Boulder	90.7	Weld, 3.3
Denver	90.0	
El Paso	94.8	
Jefferson	81.5	Denver, 13.8
Larimer	94.8	
Mesa	94.1	
Morgan	88.8	Washington, 4.8
Otero	80.3	Bent, 5.1 Crowley, 7.5
Pueblo	97.6	
Weld	93.9	
Other Colorado counties	83.6	
All Colorado counties	89.4	
Michigan		
Barry	79.1	Allegan, 4.4 Eaton, 9.4 Kent, 5.6
Bay	96.4	
Berrien	93.7	Van Buren, 3.4
Branch	83.0	Calhoun, 6.0 St. Joseph, 6.5
Calhoun	85.3	Jackson, 6.6
Eaton	76.1	Ingham, 16.6
Genesee	96.4	
Grand Traverse	85.0	Leelanau, 9.4
Ingham	92.4	
Ionia	76.8	Clinton, 3.7 Eaton, 10.6 Montcalm, 4.0
Jackson	95.9	
Kalamazoo	93.6	
Kent	92.0	Ottawa, 3.2
Lenawee	89.6	Washtenaw, 4.2
Livingston	90.7	Ingham, 3.1 Oakland, 4.2
Macomb	84.0	Oakland, 3.5 Wayne, 11.4
Monroe	96.8	
Muskegon	96.9	
Oakland	90.7	Wayne, 7.4
Ottawa	91.1	Allegan, 3.9
Saginaw	88.9	Tuscola, 3.4
St. Clair	90.7	Sanilac, 4.1
St. Joseph	88.7	Branch, 4.6 Lagrange, Ind., 4.8
Sanilac	81.9	Tuscola, 4.9
Tuscola	78.5	Huron, 6.6 Oakland, 3.0
Van Buren	86.6	Sanilac, 4.5 Berrien, 6.0 Cass, 4.5
Washtenaw	84.2	Jackson, 3.0 Wayne, 3.1
Wayne	91.4	Oakland, 4.5
Other Michigan counties	86.5	
All Michigan counties	90.2	
Tennessee		
Davidson	92.5	
Greene	88.6	Washington, 5.5
Hamilton	92.0	
Knox	88.9	
Shelby	87.7	
Sullivan	92.2	
Other Tennessee counties	86.0	
All Tennessee counties	88.4	

*Counties listed by name are those from which five or more dentists reported in the survey.

Table 2 • Per cent of patients from dentists' own district, for districts in Colorado, Michigan and Tennessee

Dentists' state and district*	Per cent of patients from dentists' district	Other districts from which more than 3 per cent of patients came
Colorado		
Colorado Springs	96.0	
Durango	92.5	Out of state, 6.6
Grand Junction	92.9	
Boulder	91.1	Greeley, 3.0
Denver	96.0	
Fort Collins	95.0	
Glenwood Springs	91.4	Salida, 5.0
Greeley	93.9	Sterling, 3.4
La Junta	89.2	Pueblo, 5.4 Trinidad, 3.8
Pueblo	97.4	
Other Colorado districts	91.7	
All Colorado districts	94.7	
Michigan		
Alma	92.7	
Bay City	95.5	
Detroit	94.2	Pontiac, 4.4
Flint	97.8	
Jackson	94.3	
Lansing	93.5	
Pontiac	91.5	Detroit, 6.8
Port Huron	91.2	Saginaw, 3.4
Saginaw	93.2	
Battle Creek	86.7	Jackson, 6.0 Kalamazoo, 3.6
Benton Harbor	94.8	Kalamazoo, 3.6
Grand Rapids	96.5	
Kalamazoo	93.2	
Muskegon	97.4	
Traverse City	97.1	
Marquette	98.5	Out of state, 3.3
Other Michigan districts	91.1	
All Michigan districts	94.1	
Tennessee		
Chattanooga	93.3	Out of state, 4.9
Greenville	89.5	Johnson City, 3.5
Johnson City	89.5	Out of state, 3.3 Knoxville, 3.6
Kingsport	94.0	Johnson City, 3.1
Knoxville	97.1	
Jackson	90.8	Paris, 5.7
Memphis	89.0	Out of state, 9.4
Columbia	93.5	
Nashville	95.7	
Shelbyville	94.8	
Other Tennessee districts	89.2	
All Tennessee districts	92.8	

*Districts listed by name are those from which five or more dentists reported in the survey.

termine whether another system might be superior to the one currently used by the Bureau for presenting the distribution of dentists. It was determined that the system used by the Bureau had the following advantages over other systems:

1. District boundaries cross neither state nor county lines. This makes for concise presentation and ease of comprehension and enables interstate and intercounty comparisons.

2. The system has a "telescoping" fea-

ture not found in other systems; that is, regions are established, each consisting of two or more districts. Probably this is especially important in the study of the distribution of dental specialists who are distributed more thinly about the country and who draw their patients from greater distances than do general practitioners.

3. The system divides the counties of the United States into 761 districts, a greater number than is used in any other system. Compactness of districts is important in the study of the distribution of dentists. In a nation-wide survey conducted by the Bureau, the *Family Dental Survey*, it was found that 88 per cent of dental patients traveled less than 15 miles to their dentist.

Two trading area systems were found that did not cross county lines and that approached the system used by the Bureau with respect to number of districts. In one of these systems, "Market Areas in the United States," developed by the Curtis Publishing Company, the percentage of patients seeing a dentist within their own district was 95.6 per cent, compared to 94.0 under the system used by the Bureau. However, the two systems had 41 and 59 districts, respectively, in the three states under study, with respective averages of 4,993 and 3,470 square miles per district. The system used by the Bureau is definitely advantageous in this respect, as well as in the telescoping feature and in adherence to state lines.

Another trading area system, often referred to as the "NEMA" system (National Electrical Manufacturers' Association), delineated 43 districts in the three states. Only 91.7 per cent of the patients saw dentists within their own district under this system, however. Thus, the groupings of counties into districts under the NEMA system is considerably inferior to the system currently used for presenting the distribution of dentists.

An attempt was made to determine whether counties could be rearranged in such a manner as to produce more valid districts; that is, increase the percentage of patients seeing a dentist within their district while retaining approximately the same number of districts per state. In the State of Michigan it was possible to arrange the counties into districts so that 96.1 per cent of the 42,062 patients obtained their dental care within the district, compared to 94.1 per cent under the system currently used. This was done without reducing the number of districts.

For the State of Colorado it was possible to regroup counties into districts so that 96.4 per cent of the patients saw a dentist within a district instead of 94.7 per cent under the system now used. In order to achieve this increase in percentage, however, it was necessary to reduce the number of districts from 16 to 13. Which of the two arrangements would be better is therefore questionable.

In Tennessee an increase in percentage of patients seeing a dentist within their district from 92.8 to 93.0 was achieved by re-formation of districts, but at the expense of cutting the number of districts from 19 to 18. However, the variability of percentages among districts was reduced by the rearrangement.

VALIDITY OF REGIONS

Under the system used by the Bureau, the 16 districts in Colorado are divided into three regions, the 24 districts in Michigan into three regions and the 19 districts in Tennessee into four regions. In its reports on the distribution of dentists, the Bureau calculates statistics for regions, districts and counties.

The percentages of patients seeing dentists within their own region were 97.7 per cent in Colorado, 98.4 per cent in Michigan and 95.3 per cent in Tennessee, for an average of 97.8 per cent. Regional boundaries were crossed by only 1,375 of the 63,072 patients. The regional figures provide a significant additional aspect in the study of the distribution of dentists.

Table 3 • Percentage distribution of dental patients according to number of miles traveled to receive dental care*

No. of miles	Colorado	Michigan	Tennessee	Total
Same town as dentist	81.8	74.8	80.6	77.0
Less than 5	.5	3.4	1.5	2.6
5— 9.9	3.8	6.2	3.2	5.3
10— 14.9	3.9	7.1	4.0	6.0
15— 19.9	1.7	3.9	3.0	3.4
20— 24.9	1.1	1.6	1.8	1.5
25— 29.9	1.2	0.9	1.5	1.0
30— 39.9	1.6	0.7	1.1	1.0
40— 49.9	0.9	0.4	0.7	0.5
50— 59.9	0.8	0.2	0.4	0.3
60— 69.9	0.4	0.1	0.1	0.2
70— 79.9	0.4	0.1	0.3	0.2
80—124.9	0.8	0.2	0.6	0.4
125—174.9	0.3	0.1	0.4	0.2
175—224.9	0.3	0.1	0.1	0.1
225 and over	0.5	0.2	0.7	0.3
Total	100.0	100.0	100.0	100.0

*Number of miles traveled was calculated only for patients who came from places other than the dentist's town.

DISTANCES TRAVELED BY DENTAL PATIENTS

The number of miles traveled by out-of-town patients and the percentage of patients from the dentists' town are shown in Table 3. Seventy-seven per cent of the 63,072 patients lived in the same town as their dentist, although this varied from about 75 per cent in Michigan to a little more than 80 per cent in Colorado and Tennessee. The average number of miles traveled by out-of-town patients was 37.7 in Colorado, 17.7 in Michigan and 35.0 in Tennessee.

By type of practice, the percentage of patients from the dentists' own town was 77.3 per cent for general practitioners; 77.9 per cent for oral surgeons; 68.7 per cent for orthodontists; 80.9 per cent for pedodontists; 74.3 per cent for periodontists, and 69.6 per cent for prosthodontists. Since many towns with general practitioners are without specialists, one would expect these percentages to be lower for specialists than for general practitioners. The fact that the percentage for oral surgeons is about the same as the percentage for general practitioners would seem to indicate that patients in smaller towns needing oral surgery usually either received this care from general practitioners in their own towns or, possibly, to some extent went without needed oral surgery. The same is true with respect to pedodontics.

The average number of miles traveled by out-of-town patients was 21.8 for general practitioners; 26.0 for oral surgeons; 28.9 for orthodontists; 21.4 for pedodontists; 43.0 for periodontists, and 33.3 for prosthodontists.

CONCLUSIONS

This survey indicates that the system of districts and regions within states that is currently used by the Bureau in its reports on the distribution of dentists is definitely superior to any other system available at this time, from the standpoints of validity, compactness, comparability, and all around usefulness in studying the distribution of dentists.

Undoubtedly it would be possible to improve the present arrangement of counties into districts somewhat by conducting a nation-wide survey of patient-to-dentist travel. This method for establishing districts is completely objective, which cannot be said for methods used in the establishment of many other systems. The main disadvantage in using this method for establishing a new national system of dental service districts is the low rate of response to the mail survey. Possibly ways of improving the rate of response can be devised in the future.

In this article several references have been made to the publication *Distribution of Dentists in the United States by State, Region, District and County*. Single copies of this booklet may be obtained without charge on request to the Bureau of Economic Research and Statistics.

BUREAU OF DENTAL HEALTH EDUCATION

Conference on cooperation in school dental health education

On June 7, 8, 1956, representatives of five state departments of education and six state dental societies met at the headquarters of the American Dental Association in Chicago to explore methods by which state dental societies and state departments of education might work together more effectively in the promotion of school dental health education.

Already several state dental societies are participating in school dental health education and quite successfully. In some instances, however, this work is being done with little or no regard for existing organizations set up for this kind of activity. Although in some states there is a fair degree of cooperation between the state dental society and the state department of education, there is apparently a great need, even in these states, to bring their activities into closer coordination.

RESPONSIBILITY OF THE DENTAL PROFESSION

The objective of the American Dental Association as stated in its constitution "shall be to encourage the improvement of the health of the public and to promote the art and science of dentistry."

The *Principles of Ethics* of the Association states:

> The dentist has the obligation of providing freely of his skills, knowledge and experience to society in those fields in which his qualifications entitle him to speak with professional competence. The dentist should be a leader in his community, especially in all efforts leading to the improvement of the dental health of the public.

With this tradition of service and leadership, dental societies seek to improve the dental health of the public and particularly of school children through dental health education as well as through making dental services available.

The dental profession recognizes that the basic responsibility for education of the child rests with the schools. The profession seeks only to assist schools to the best of its ability to encourage, promote and improve the health of the school child.

STATE DEPARTMENTS OF EDUCATION AND SPECIAL INTEREST GROUPS

Many organizations and agencies with special interests are seeking consideration for their programs from the state departments of education. It is important, therefore, that state dental societies understand the functioning and responsibilities of educational agencies so that they may seek cooperation in a way that will fit into the existing pattern of operations.

The dental society should establish liaison with school people through appropriate administrative channels—in most instances with the state superintendent of public instruction. A working relationship with state departments of education is usually maintained through the state director of health and physical education or, where no such position exists, a staff member from the state department of education who has been assigned the responsibility of health and physical education.

STATE HEALTH COUNCILS AND ADVISORY COMMITTEES

A number of states have health councils or committees of one kind or another

which serve to coordinate the health activities of official, voluntary and professional organizations. Where such councils are in operation, the dental society should actively participate. Program proposals or suggestions should then be made through this body since official state agencies are members of existing councils and a line of communication is already established.

ROLE OF THE STATE DENTAL DIRECTOR

Most state departments of health employ a dental director to supervise the dental public health programs in the state. Since he is accustomed to working with state agencies, the dental director can be of great assistance to the dental society in making the initial approach to the state department of education.

The dental director, because of his extensive knowledge of the dental problems in the state, can assist the dental society also in planning a dental health education program. He should not, however, be asked to shoulder the responsibility that rightly belongs to the dental society and its members. Even though he is a member of the society, he should not be asked to represent the dental society officially on such committees as advisory school health committees and other similar bodies. That is more properly the function of a private practitioner.

GUIDING PRINCIPLES FOR DENTAL SOCIETIES

In order that state dental societies may work in harmony with state departments of education, the members of the conference propose the following principles to serve as guides to state dental societies:

Dentists have a social and professional obligation to contribute to the improvement of the health of the people through a program of dental health education. Dental societies should concern themselves with the nature, scope and authenticity of information about dental health which is presented to various segments of the population.

The dental society should work within the framework of the official state educational agency already in existence and in accordance with accepted educational principles.

The state dental director, representing the state board of health, should be included in any program planning by the dental society.

The state dental society should have a committee, council or other similar body to represent it in its relationship with the state department of education. Members of this committee should be selected on the basis of interest and ability and willingness to devote time to the job.

Initial contact with the state department of education should be made through the state superintendent of public instruction. Continued liaison may then be maintained through the delegated representative within the department.

The dental society should be able to demonstrate by results of surveys or other studies the need for increased emphasis on school dental health education.

An effective dental health education program can be developed best within the framework of a well-rounded total school health program. The dental society should, therefore, lend its support to the development of a total school health program.

The dental society should concern itself with those aspects of school health in which it has greatest competence but give support to other aspects as well.

GUIDING PRINCIPLES FOR DEPARTMENTS OF EDUCATION

Although the conference was interested primarily in arriving at principles for dental society activity, the representatives of education at the conference suggested the following principles to assist state departments of education.

State departments of education should be as alert to the dental health needs of children as to any other health need.

State departments of education should be receptive to and even seek assistance of professional groups that can help in the school health program.

Dental societies should be invited to participate as members of committees or special study groups giving consideration to school health problems.

All the principles stated may be applied to local dental societies and local school systems as well as to their state counterparts.

ASSISTANCE IN PROGRAMS

The state dental society members may assist in school dental health education programs in the following ways:

Work on committees developing or revising teacher's guides or courses of study in health education. The dental society can be especially helpful in assuring scientific accuracy of the subject matter included and its pertinence to local situations.

Participate in the evaluation of teaching materials in dental health being used in schools.

Participate in preservice and inservice education of teachers in dental health.

Take part in school health conferences and workshops for teachers, nurses or other school personnel.

Make certain types of educational materials available which schools otherwise could not obtain.

Provide advice, consultation and assistance to educators planning school dental health programs.

Be aware of and give support to efforts of school and health officials to improve total school health programs. This should be in accordance with policies of the society.

The primary concern of the dental profession in relation to school health is that school age children receive instruction and have experience that will result in maximum dental health. Through established channels and in accordance with the best educational philosophy, the dental profession should engage in those activities that result in schools providing this instruction and these experiences. The dentist must not take the place of the teacher or attempt to establish channels outside the educational system for reaching the school child.

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The series of slides on roentgenography reviewed in this article have been prepared by the dental division of Eastman Kodak Company under the supervision of A. Porter S. Sweet, D.D.S., editor of *Dental Radiography and Photography*. The slides, with their accompanying mimeographed guides, are available for rental ($1.50 each series) from the Film Library, to dental societies, study clubs, dental schools, armed services, and other professional groups. Requests for purchase should be directed to Eastman Kodak Company, Rochester, N. Y.

Since the number of sets of slides is necessarily limited, it is suggested that program chairmen plan their programs far enough in advance to insure availability.

SLIDE REVIEW

S29 Radiodontic Landmarks of the Maxillae (1950) • 42 slides, black and white, with guide. Prepared by A. Porter S. Sweet, D.D.S.

The various landmarks of the maxilla which can be used for diagnostic purposes, the roentgenographic images that may be misinterpreted, and the significance of both are discussed.

S30 Radiodontic Landmarks of the Mandible (1950) • 26 slides, black and white, with guide. Prepared by A. Porter S. Sweet, D.D.S.

Various anatomic entities of the mandibular regions are shown to acquaint the operator with the normal aspects and assist him in interpreting lesions involving the mandible.

S31 Pitfalls of Radiodontics (Part I, Exposure, 1950) • 33 slides, black and white, with guide. Prepared by A. Porter S. Sweet, D.D.S., and H. H. Ingram.

A method to establish correct vertical and horizontal angulations when recording images of teeth and investing structures is shown.

S32 Pitfalls of Radiodontics (Part II, Processing, 1950) • 42 slides, black and white, with guide. Prepared by A. Porter S. Sweet, D.D.S., and H. H. Ingram.

Ways to avoid pitfalls in the processing room by the use of correct standardized processing technics are shown.

S33 X-rays and Your Teeth (1950) • 32 slides, black and white, with guide. Prepared by the dental division of Eastman Kodak Company.

The important role of roentgenograms in dental practice is demonstrated.

S34 Median Anterior Maxillary Cysts (1950) • 23 slides, black and white, with guide. Prepared by George A. Morgan, D.D.S., Toronto, Canada, for Eastman Kodak Company.

A brief review of the anatomy of the incisor canal precedes the showing of various types of median anterior maxillary cysts. The series concludes with complete enucleation of such a cyst occurring in an edentulous mouth.

S35 Occlusal Radiography of the Mandibular Third Molar (1950) • 22 slides, black and white, with guide. Prepared by Marguerite Hunt Donovan, department of radiology, University of Illinois College of Dentistry, for Eastman Kodak Company.

The need for a complete roentgenographic examination of an impacted third molar is stressed. This consists of periapical, lateral jaw and occlusal roentgenograms, with demonstrations on patients of the technics for obtaining the best results.

S36 Radiographic Study of Edentulous Jaws (1950) • 32 slides, black and white, with guide. Prepared by Ralph W. Edwards, D.D.S., for Eastman Kodak Company.

The importance of roentgenograms in discovering latent infections, unerupted teeth, fractured roots and foreign objects prior to denture construction is shown.

S37 An Unseen Dental Practice (1950) • 46 slides, black and white, with guide. Prepared by A. Porter S. Sweet, D.D.S.

The kinds of pathologic conditions are shown which may be inadvertently overlooked by the dentist who does not use roentgenograms as a routine part of his practice.

The film, "Beauty with Oral Health," reviewed in this article, is available for rental ($2.50) from the Film Library, 222 E. Superior St., Chicago. Since the number of prints is necessarily limited it is suggested that program chairmen plan their programs far enough in advance to assure availability.

FILM REVIEW

Beauty with Oral Health • 16 mm., color, sound, 54 minutes. Produced in 1954 by W. C. McCaskill, D.D.S., for the J. M. Ney Co. Photography by Dr. McCaskill and Athol Dickson. Purchase arrangements may be made by writing to producer.

This film shows the steps involved in the construction of a three tooth anterior fixed bridge in a patient, utilizing the hydrocolloid technic. The film opens with roentgenograms and photographs of the patient in need of restorations. Diagrams, models and charts of the mouth show the procedures. These steps and the fees are discussed with the patient before the work is begun. A local anesthetic is used. Diamond disks at speeds greater than 6,500 rpm are employed while the assistant uses the water spray. The assistant prepares the alginate and later the hydrocolloid impression. The conventional technics are followed and the film concludes by showing the completed restoration.

The photography is good. The use of roentgenograms, charts, models and photographs increases the instructional value of the film. The completion and setting of the bridge follow procedures in common practice today, although some practitioners may prefer the use of the full gold veneer jacket crown as a more esthetic abutment. This film is more suitable for dental students, dental assistants, and patients than for dental practitioners.

Additions to the Library

The books listed here have been added recently to the Library collection. Requests for this material, available on loan to all members of the Association, should be addressed to the Bureau of Library and Indexing Service. There is no charge for borrowing these books. Most of the books may be purchased also through the Library.

BOOKS

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COUNCIL ON DENTAL RESEARCH

Supplement to the list of certified dental materials

ADDITION • Since the publication of the most recent List of Certified Dental Materials Revised to November 1, 1955 (J.A.D.A. 52:58 Jan. 1956), the following material which conforms to the American Dental Association Specification No. 1 for Dental Amalgam Alloy has been added.

CERTIFIED DENTAL AMALGAM ALLOYS
(A.D.A. SPECIFICATION NO. 1)

Alloy	*Manufacturer or distributor*
Pearlol	Wildberg Smelting & Refining Co.

OCTOBER 1956

LON W. MORREY, D.D.S., EDITOR
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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Democracy in action: the House of Delegates

As this issue of the JOURNAL goes in the mail, members of the Association who are fortunate enough to attend the ninety-seventh annual session in Atlantic City will have the opportunity of witnessing their national organization in action. They will see how the legislative body of the Association—the House of Delegates—functions and how the rules and regulations and policies governing organized dentistry in the United States are formed. Each annual session gives the observant member who ordinarily takes little active interest in organization affairs some idea of the sacrifice in time, money and effort made by Association delegates whose only reward lies in the knowledge that they have contributed to the improvement of their profession.

There is no body more influential in American dentistry nor more democratic in action than the House of Delegates. The House can enact, amend and repeal the Constitution and Bylaws. It can grant, amend or revoke charters of constituent societies. It can elect life, honorary and associate members. It can create special committees. It has the duty to elect the elective officers, elect the members of the Board of Trustees, elect the members of the Association's councils, adopt an annual budget and serve as the court of appeal from decisions of the Judicial Council.

Once each year the House meets to consider the reports and resolutions introduced by members of the House, Board of Trustees, special and standing committees. All resolutions and reports after presentation are referred to a committee for study,

during which time any Association member may appear before the committee to ask questions or state opinions. After the hearings the committee prepares its recommendations which are studied by the House and accepted, modified or rejected.

Each annual session finds an increasing number of Association members attending meetings of the House and its reference committees. This increasing attendance has broadened the appreciation of how the policies of the Association are determined, and, of equal importance, it has provided additional information for the reference committee members. Many scores of dentists appeared before the hearings of the Reference Committee on Insurance which considered O.A.S.I. at the 1955 meeting, and no doubt several committee hearings at the 1956 annual meeting will be equally well attended. Members should seize such opportunities to observe firsthand how their organization functions and to voice their opinions at the reference committee meetings. Members of reference committees appreciate all the help they can receive in the form of intelligent advice and comment.

The scientific programs of the Association are helpful and important to the man in practice, but so are the problems facing the House each year. In fact, the nonscientific problems before the House—in these days of fast-moving change—may have a more far-reaching influence on dental practice than the development of a new drug or preventive technic.

Health problems of the dentist

A physical examination clinic operated at the annual session of the American Medical Association[1] this year produced some valuable but not unsuspected data regarding the state of health of our nation's physicians. Tuberculosis was suspected in 6 per cent of the physicians who underwent roentgenographic examination, and abnormal conditions were noted in 10 per cent of those who had electrocardiograms. An additional 5 per cent were listed as borderline cases. Physicians are not noted for the care which they take of their personal health—neither are dentists. Who believes that a similar sampling of dentists taken at an annual session of the Association would yield results less shocking?

Perhaps the panel discussion on "Health Problems of the Dentist" presented at this year's session of the Association in Atlantic City will encourage the establishment of an examination booth at a future session of the Association where members can receive a medical and dental examination. The availability of such a service might stimulate more dentists to take more interest in their health. Certainly far too many dentists are negligent in this respect.

Such neglect is not unique to America. The problem is international. Writing recently in *Suomen Hammaslääkäriseuran Toimituksia*,[2] Leo Noro presents some of the occupational hazards of dentistry and takes to task those in the profession who habitually ignore them. Monotonous work motions, constant muscular tension and difficult work stances should be guarded against and corrected before they impair

circulation, harden arteries and produce neuritis and muscular disturbances. A work stance and work mode that avoid continuous muscular tension are desirable and so too are exercises devised to restore muscle tone and elasticity. The feet, the legs and the back of the dentist are subject to particular stress and strain and should be given special care and attention in the way of rest, massage and physical therapy. Since the practice of dentistry requires exceptional visual acuity, the care of the eyes is extremely important. Faulty vision is no more uncommon among dentists than among the laity, and periodic eye examinations and proper adjustment of glasses prevents eye strain and subsequent fatigue and headaches. Eye shields to protect the eyes against sharp and bacteria-laden splinters should be worn while operating.

Common-sense protective measures against specific occupational hazards as well as common-sense precautions against the usual vicissitudes of life are important barriers against a weakened constitution, chronic illness and premature death.

From 1951 to 1954 inclusive the nation lost 3,707 dentists through death;[3] diseases of the circulatory system accounted for 54.89 per cent of the dentists who died during that period. Unquestionably, some of these deaths could have been prevented if the dentist had had a greater respect for the hazards of his occupation and taken greater precautions against them.

The nation cannot afford lessened dental output through illness, nor can it afford to lose dentists through premature death.

1. A.M.A. Secretary's Letter No. 370, July 27, 1956.
2. Noro, Leo. The dentist's occupational health. Suomen hammaslääk.toim. 51:22 March 1955.
3. Moen, B. Duane. Mortality of dentists, 1951-1954. J.A.D.A. 52:65 Jan. 1956.

Public relations, the dentist and prosthetic services

On pages 458 to 460 of this issue is published a short, pertinent article entitled "Why Public Relations?" Originally issued in pamphlet form by the Canadian Dental Association, it is brought to the attention of JOURNAL readers by the Council on Dental Trade and Laboratory Relations of the Association with the approval of our sister society north of the border. "Why Public Relations?" points out factually and forthrightly that the dentist must share with the dental laboratory technician some of the blame for the present critical relationship that exists between the profession and the craft, and that both must share equally the responsibility of improving that relationship.

Every dentist, every dental laboratory operator, every dental laboratory technician, in fact everyone associated with and interested in the practice of dentistry, should take the time to read—and to digest—this twelve hundred word article dealing with the dentist and prosthetic service. Its sane exposition of one of the most vexing problems now facing the profession, its fair-minded analysis of some of the weaknesses, both in the profession and in the dental laboratory craft, that contribute to the problem and its suggestions for a solution throw a bright light on a dark subject.

Wanted: More mouth protectors and fewer damaged teeth

Once again the United States enters a football season. Once again millions of spectators will enjoy watching thousands of youngsters revel in a contact sport which fast is becoming the nation's number one pastime. So great has the participation in football grown that the cost of outfitting players has become an item of no mean proportions to many secondary schools. When this year's well-dressed football player charges out of the locker room onto the field his clothes and accouterments represent an outlay that may run from $125 to $175.[1] Even so, such armament fails to protect him adequately.

For want of a mouth protector he is subject to serious injury.

About 54 per cent of all high school football injuries are facial and dental.[2] Experience has shown that mouth protectors can lessen drastically this damage.[3] Dentists are urged to initiate measures to reduce to a minimum the incidence of such injuries to the youth of their communities.

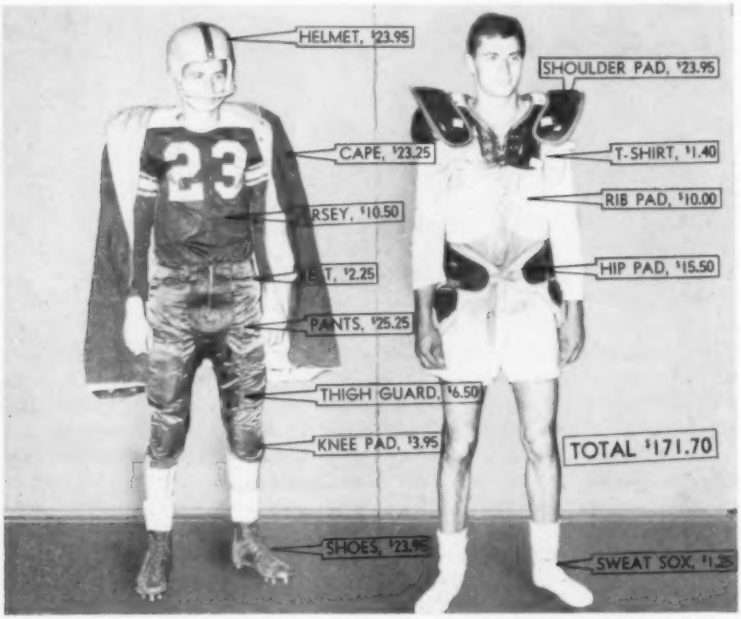


Photo courtesy Chicago Daily News

1. Nangle, Bud. Chicago Daily News. Sept. 10, 1956, page 28.
2. Athletics a part of education. Editorial. Athletic Journal 36:26 Nov. 1955.
3. Rubber mouth protectors. Washington Post. Jan. 11, 1956.

Washington News Letter

The election campaign atmosphere is apparent even in the feverish activity of federal agencies to rush the implementation of national health legislation enacted by Congress this year, legislation for which both parties claim credit.

For weeks a special task force in the Department of Defense has been working literally night and day to perfect the program for civilian health care for dependents of military personnel. Planning of a new building for the National Institute of Dental Research is moving at a fast pace. By the time this article appears in print, the first grants probably will have been made for construction and expansion of medical and dental research facilities. Studies are under way on the feasibility of making deductions from federal employees' pay envelopes to permit their coverage in prepayment medical—and possibly dental—care plans, with the government paying part of the cost.

Although routine dental care will not be included in military dependents' services, performed either by uniformed or civilian practitioners, dentistry will not be wholly outside the program. Newly adopted regulations specify that dental care shall be provided when it is deemed a necessary adjunct to medical or surgical treatment. Also, the emphasis on complete obstetrical and maternity services available to dependents would appear to leave the way open to provision of corrective dental care in the interest of the patient's welfare. Finally, dependents are made eligible for dental attention when they are overseas or "in remote areas within continental United States . . . where adequate civilian dental facilities are not available."

The advisory council which will pass on applications for research construction grants was appointed in mid-September by Secretary Marion B. Folsom of Health, Education and Welfare. Its first meeting was scheduled to be held in Washington September 24 and 25.

Representing dentistry on the council is Paul C. Kitchin of Columbus, Ohio, professor of dental histology and embryology in the School of Dentistry, Ohio State University.

The group includes four medical school deans, four university professors, two industrialists, a lawyer, a representative of the National Science Foundation and, serving as chairman, Surgeon General Leroy E. Burney of the U. S. Public Health Service.

For the first year of the three-year research construction plan, Congress made 30 million dollars available for distribution in federal grants. Awards must be matched by recipients on a dollar-for-dollar basis.

RESEARCH ADVISORY COUNCILS

October is meeting month for practically all of the advisory councils to the National Institutes of Health. The unprecedently large sums appropriated for support of medical research in 1956-57 indicate the forthcoming approval of a record number of awards.

As a result of recommendations made by the councils at their meetings last June, the U. S. Public Health Service awarded 3,967 research grants totaling $48,879,678. The National Institute of Dental Research will administer 102 of these awards, aggregating $901,494. Forty-seven are for support of new projects ($382,217) and 55 are continuation grants ($519,277).

Largest sums were allocated for heart research ($10,407,030), cancer ($9,868,856) and noncategorized research studies ($6,535,578).

The House Committee on Government Operations recently published volume 7 of its public hearings conducted last spring on civil defense for national survival. This volume contains testimony and statements presented by national spokesmen for health and hospital services, including the American Dental Association.

In a statement filed by J. Claude Earnest of the Council on Legislation, the A.D.A. described measures taken by the profession to interest and train dentists in civil defense duties and emphasized that the effort could be aided materially by increased federal direction.

Lieut. Col. Crandall I. Koons has been appointed to serve as liaison officer for the Army Medical Service dental reserves on the staff of Col. James H. Kidder, special assistant to Surgeon General Silas B. Hays for the Reserve Forces.

A native of Patoka, Ill., and a 1930 graduate of the St. Louis University School of Dentistry, Colonel Koons was scheduled to assume his new post late in September after completing a tour of duty as post dental surgeon at Fort Jay, N. Y. He will attend the American Dental Association meeting in Atlantic City.

Holder of a commission in the Army Dental Reserve since graduation in 1930, Colonel Koons practiced privately in West Frankfort and Centralia, Ill., until he was called to active duty in 1941. His wartime service includes a year in Europe in 1945 and 16 months in the Far East in 1950-51. He holds the Bronze Star Medal for exceptional duty in Korea.

International Correspondence

NEWS FROM GREAT BRITAIN

The Royal College of Surgeons of Edinburgh recently invited J. Menzies Campbell to deliver an address commemorating the fact that the teaching of dental surgery in Edinburgh has now been continuous for 100 years. This oration was delivered in the hall of the College in the presence of the president, Sir Walter Mercer; Dr. F. G. Gibbs, convener of the Dental Council, and a distinguished audience representing Scottish surgery and dental surgery.

Dr. Campbell gave a biographical address on Dr. John Smith who on Monday, June 2, 1856, delivered the first lecture of his course on the physiology and diseases of the teeth. Dr. Campbell had many important corrections to make on the previous biographical notices which have appeared on Smith. As the life story was unfolded, the personal greatness of the man and the importance of his contribution to dentistry became more and more apparent, and it is surprising that he has been allowed to slip into the background.

Smith's lectures were popular and were repeated; interest in dentistry grew. Smith saw that the arrangements for providing dental treatment for the needy were inadequate, and he established the Edinburgh Dental Hospital and School.

DENTAL EDUCATION

Prof. H. H. Stones writes that the dental education advisory council of the dental schools of Great Britain and Ireland from time to time sponsor teachers' conferences at each of which a subject in the dental curriculum is discussed. The meetings are held in different dental schools, and each university or dental school is invited to send one or two delegates who are usually teachers of the subject to be discussed. A conference was held recently at Queen's University of Belfast where anatomy and dental anatomy were considered.

In this country the dental student is taught anatomy in the medical school, and the curriculum is usually limited to the study of the head region, neck and thorax with a very elementary study of the abdomen. In several universities the degree (B.D.S.) student dis-

sects the whole body as does the medical student. This requirement, which is of advantage to the occasional dental student who wishes to take an additional medical qualification, has been discontinued by most universities.

Dental anatomy is usually taught in the dental school by a dentist, and the course taken after the commencement of the study of anatomy.

The conference reached general agreement on the following points: (1) The teaching of anatomy and dental anatomy should be closely integrated. (2) Although the student should have some comprehension of the body as a whole, he should know in detail the anatomy of the mouth and associated parts. The present terminology in dental anatomy is in need of revision. (3) Teachers in dental anatomy should have a background in anatomy as well as an interest in dental anatomy. (4) The teaching of anatomy and dental anatomy should be closely linked with the teaching of clinical subjects so that ideas from the various courses can be related. (5) The postgraduate study of anatomy provided opportunities for the research worker and specialist.

The following are the chairmen of the standing committees of the General Dental Council: ancillary dental workers committee, Prof. R. Bradlaw; disciplinary committee, Sir W. Fish; finance committee, Mr. F. Ballard; education committee, Prof. F. Wilkinson; dental health education, Mr. E. Samson, and executive, Sir W. Fish.

BRITISH DENTAL ASSOCIATION

The library of the British Dental Association has just published a catalogue of books added to the library since 1945. The "packages," collections of articles from periodicals, are listed also as are those periodicals currently received in the library. It is interesting to see how many of these there are, and from what a wide range of countries they come. The catalogue can be obtained from the librarian, price 2s.6d. (35 cents), postage free.

The Association has taken steps to lodge a protest to the appropriate authority against the proposal of the new General Dental Council to raise the annual registration fee to £4.10.

The General Dental Council acquired the assets of the old Dental Board and to raise the registration fee by 80 per cent is considered premature; any proposal for a raise should have been left until the expenses of the General Dental Council could be more accurately assessed.

PUBLIC DENTAL SERVICE

The annual reports of 1955 for the education committees of Cornwall and Nottingham County Council contain dental sections which reveal the difficulties experienced by the authorities in providing an effective dental service.

In Cornwall the school population is over 46,000 with a dental staff of ten, and in Nottingham the figure is 87,000 school children with a staff of nine full-time and three part-time dental officers.

Dr. Mason, the senior dental officer for Nottingham, concludes his report as follows: "One may logically assume, therefore, that the dismal picture created by the unsatisfactory staffing position during 1955 will become a still more dismal picture at the commencement of 1956. Our County Dental Clinics which should be the centre at which preventive dentistry is practised and taught, are becoming more and more like the out-patient departments of hospitals to which patients are sent for emergency treatment for the relief of pain. This position is the exact opposite of the main purpose of the School Dental Service, and it is unfortunate to have to state that at the time this report is being compiled there seems no prospect of an early solution of this sad problem."

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

Association Affairs

EXPLAIN PREPARATION OF RESEARCH GRANT APPLICATION

A new booklet prepared by the Association explains the procedure used in applying for research grants from federal agencies. The booklet applies particularly to the $3,715,000 grants and fellowship program administered by the National Institute of Dental Research. The nearly four million dollars, appropriated by the Congress at its last session, is about six times the sum appropriated for the grants and fellowship program last year.

The Association's booklet explains the grants program, the processing of applications, describes the preliminary work to be done before applying for a grant and the preparation of application forms.

In announcing the new booklet, H. Trendley Dean, secretary of the Council on Dental Research, particularly stressed that applications must be received by the National Institute of Dental Research before November 1 to be considered at the March meeting of the NIDR advisory council. Applications received after November 1 will not be considered until next June.

The new booklet, *Suggestions on How to Prepare Applications for Research Grants,* may be obtained from the Council on Dental Research at the Central Office.

ASSOCIATION RESEARCHER DISCOVERS NEW ENZYME

The discovery of a new enzyme, important in the release of two amino acids from protein, was announced by the National Institute of Dental Research in August. The enzyme, named carboxypeptidase-B, was isolated by John E. Folk, Ph.D., American Dental Association research associate at the NIDR.

Unlike classical carboxypeptidase, the new enzyme rapidly releases from ingested protein the essential amino acids lysine and arginine and may be the most important mechanism by which these amino acids are made available to the body from food. Dr. Folk's discovery may contribute greatly to the understanding of protein structure and synthesis.

INFORMATION BULLETIN ON O.A.S.I. SENT TO MEMBERS

A bulletin providing information on the taxes and benefits of the Old Age and Survivors' Insurance system as it applies to dentists has been mailed to all members of the Association.

The bulletin points out that all dentists who earn a minimum of $400 a year in private practice are now covered by O.A.S.I. The self-employed dentist will pay the O.A.S.I. tax for the first time when he files his 1956 federal income tax return next spring. The tax on 1956 income is 3 per cent on net earnings up to $4,200.

The self-employment O.A.S.I. tax is computed on net income, the bulletin states. Any business expense which is deductible in computing federal income taxes such as office rent or membership dues in professional organizations is also deductible in computing the self-employment tax. Personal deductions, however, may not be subtracted in figuring the tax.

Each dentist should have a social security card, obtainable through his local social security office.

The complicated formula for figuring benefits is explained in the bulletin. Four general types of benefits are payable: (1) retirement benefits for the insured person, (2) survivors benefits, (3) disability benefits and (4) lump sum death payments. Although an individual should keep informed at all times of his status under O.A.S.I., there are four times when he should consult promptly the nearest social security district office, the bulletin states. These times are when a worker in the family dies, when the insured individual reaches age 65 (age 62 for women), when the insured individual reaches age 72 and when he becomes totally disabled.

Additional information may be obtained from any local social security district office. THE JOURNAL also will publish additional facts in forthcoming issues.

STUDENT MEMBERS ELIGIBLE FOR EXPANDED INSURANCE

Student members of the American Dental Association are eligible for the Association's Group Life Insurance Program, whose lowered premiums and expanded benefits became effective the first of this year.

In making the announcement, J. S. Eilar, chairman of the Council on Insurance, pointed out that the cost of life insurance for members under 30 is less than half that of government life insurance offered by the Veterans Administration. Insurance may be obtained through the Association for three dollars per thousand; for $30 annually, a student member obtains the maximum $10,000 life insurance protection as well as the $20,000 accidental death coverage, he stated.

"We feel the Association life insurance program is a valuable feature of student A.D.A. membership, especially important today as many young people have family responsibilities while they are still in school," Dr. Eilar said. Policies issued to students remain in effect after graduation for as long as membership in the Association is maintained.

Student A.D.A. membership cards and brochures on the insurance policy have been distributed to deans of the dental schools.

SENIORS SURVEYED FOR ARMED FORCES PREFERENCE

The draft status of 1957 senior dental students and the branches of the Armed Forces in which they prefer to fulfill their military obligations will be known this month with the completion of the 1957 Senior Dental Student Survey. The survey is conducted at the request of the Department of Defense by the American Dental Association's Councils on Federal Dental Services and Dental Education.

Purpose of the survey is to provide the Defense Department with information needed to meet its health personnel requirements and to give students a reasonable opportunity to be commissioned in the branch of their preference and to enter on active duty at a time convenient to them.

The Department of Defense reports that 81.8 per cent of the 1956 graduates who participated in last year's survey were inducted into the service of their first choice.

This year the Councils will survey the draft status of freshmen students. Previously, the freshman survey was conducted by the American Association of Dental Schools.

100,000 DENTISTS LISTED IN AMERICAN DENTAL DIRECTORY

More than 100,000 dentists in the United States and its possessions are listed in the 1957 edition of the *American Dental Directory*, announces John J. Hollister, Association business manager. The *Directory* lists dentists both alphabetically and geographically. In addition to the

dentist's name and address, the book shows Association membership status, character of practice, school and year of graduation.

Information is provided on requirements of licensure examination. The *Directory* includes a list of dental schools, dental specialists, addresses of state dental organizations as well as those of national dental organizations around the world.

The prepublication price—for prepaid orders received before November 1, is $6. After November 1, the regular price of $7.50 will apply. Copies of the *Directory* may be obtained from the Order Department at the Central Office, 222 E. Superior St., Chicago 11.

MEMBERSHIP AT 86,235; CONTINUES UPWARD CLIMB

Membership in the American Dental Association continued its upward climb to reach 86,235 at the end of August. The August 31 figure was 251 over the month previous and 1,384 over the 1955 year-end total. There were 76,263 fully privileged members and 9,742 student members included in the tabulation.

CHILDREN'S DENTAL HEALTH WEEK PREPARATIONS BEGIN

Promotional materials, prepared by the Bureau of Dental Health Education, are being mailed to dental societies for use in the 1957 Children's Dental Health Week. The 1957 observance is scheduled for February 3-9. It will be the ninth annual celebration.

Theme for the week is "Looking to the future, acting in the present, for better dental health." The program planning packets prepared by the Association contain suggestions for health week programs, sample proclamations, speeches, news releases, leaflets, radio and TV scripts and spot announcements.

LEAFLET FOR PATIENTS TELLS VALUE OF FLUORIDES

A newly revised leaflet, *Fluoride Means Less Tooth Decay*, written for the dentist's patients and for use with community groups, explains the effectiveness, safety and economy of water fluoridation. The leaflet, prepared by the Bureau of Dental Health Education, discusses also the use of topical application of fluorides. Results of studies such as the ten year Grand Rapids, Mich., program are cited briefly. The six page leaflet is printed in black ink on light blue paper. It may be obtained from the Order Department at the Central Office at the following prices: 25 copies, 55 cents; 50 copies, $1; 100 copies, $1.70; 500 copies, $8.07, and 1,000 copies, $15.30.

LEROY ENNIS CHOSEN FOR POST ON ASSOCIATION COUNCIL

LeRoy M. Ennis of Philadelphia was chosen vice-chairman of the Association's Council on International Relations at a Council meeting July 29 in Chicago. Dr. Ennis recently served as dental consultant to the government of Egypt. Obed H. Moen of Watertown, Wis., was re-elected secretary. Dr. Moen is a vice-president of the Fédération Dentaire Internationale. Council chairman is Oren A. Oliver of Nashville, Tenn. Plans were considered for maintaining a list of U.S. trained dentists practicing abroad.

Research

PAUL KITCHIN TO ADVISE USPHS ON BUILDING GRANTS

Paul C. Kitchin of Columbus, Ohio, professor of dental histology and embryology at the School of Dentistry, Ohio State University, has been appointed a member of the advisory council on the

new program of federal grants for construction of health science research facilities.

The grants program was authorized by Congress at its last session to assist institutions such as medical and dental schools build and equip research facilities. The 90 million dollar program will be administered by the U. S. Public Health Service.

The 12 member national advisory council on health research facilities on which Dr. Kitchin serves includes eight members from the science fields and four from the general public. The council met in late September to consider initial applications from research institutions.

Dr. Kitchin is a member of the American Dental Association's Council on Dental Therapeutics. He is a trustee and past president of the International Association for Dental Research. In 1949 he was appointed to the USPHS national advisory dental research council and was secretary of the dental section of the American Association for the Advancement of Science from 1939 to 1942. Dr. Kitchin holds the B.S., M.S. and D.D.S. degrees as well as an honorary doctor of science degree from Washington University in St. Louis.

THOMAS CLUNE, J. R. BLAYNEY CHOSEN FOR ADVISORY POSTS

The U. S. Public Health Service in mid-September announced the appointment of Thomas W. Clune, director of dental public health, Rhode Island Department of Health, and J. R. Blayney, former director of Walter G. Zoller Memorial Dental Clinic, to the National Advisory Dental Research Council. The Council makes recommendations to the Surgeon General regarding research activities of the National Institute of Dental Research.

Dr. Clune and Dr. Blayney will serve a four year term beginning October 1. They replace Thomas J. Hill of Cleveland and Wallace D. Armstrong, M.D., of Minneapolis, whose terms have expired.

Dr. Clune has been Rhode Island dental director since 1938. He received his dental degree from Tufts University School of Dental Medicine and his Master's degree in public health from Massachusetts Institute of Technology. He is a former chairman and secretary of the Rhode Island Board of Dental Examiners and is presently a member of the executive board of the American Association of Public Health Dentists.

Dr. Blayney holds the D.D.S., B.S. and M.S. degrees. He has had a long teaching career and is emeritus professor of dental surgery at the University of Chicago. Dr. Blayney is director of the Evanston dental caries study and is vice-chairman of the American Dental Association's Council on Dental Research. He holds the Howard Taylor Ricketts Award and the John R. Callahan Award of the Ohio State Dental Association.

USPHS AWARDS TWO SCHOOLS $42,000 FOR DENTAL STUDIES

Four research grants from the U. S. Public Health Service totaling $24,000 have been awarded Northwestern University Dental School and a three year $18,000 dental project has been approved for the School of Medicine at the College of Medical Evangelists in Loma Linda, Calif.

Largest of the grants to the Chicago school, $7,500, will be used by L. S. Fosdick, Ph.D., professor of chemistry, and R. Q. Blackwell, Ph.D., assistant professor of chemistry, for a study of the chemical composition of the enamel rods of the teeth. A second grant will be used by Dr. Fosdick for research on the role of saliva in protection against caries. Other awards were to J. C. Calandra, M.D., professor of pathology, and J. H. Kay, Ph.D., assistant professor of bacteriology, for a study of how different chemical

ions may combine with proteins in tooth enamel and dentin, and to Orion H. Stuteville, D.D.S., M.D., professor of maxillofacial surgery, who will investigate the effect of fractures of bone joints on the growth of jaws.

The $18,000 grant to the College of Medical Evangelists will finance a study by Jack D. Zwemer, D.D.S., assistant professor of microbiology, on serochemical induction of gingival and periodontal pathosis in the hamster.

The USPHS in late August announced that grants made thus far from fiscal 1957 funds for dentistry totaled $901,494 for 102 research projects. Of the total, 47 are new grants; 55, continuations.

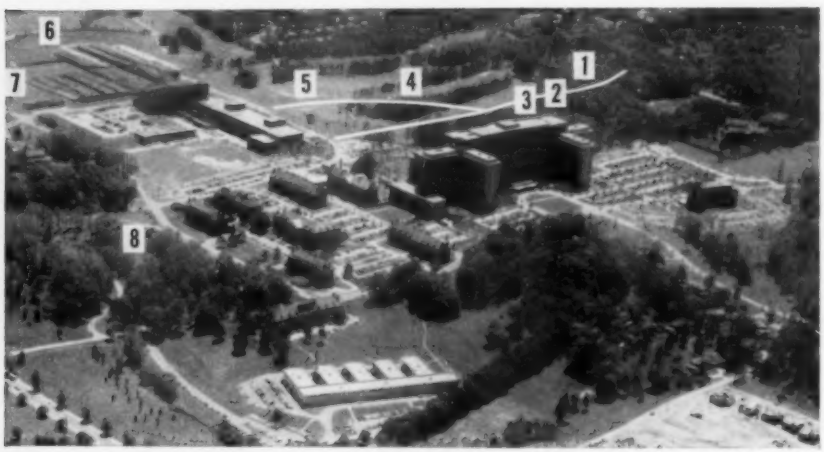
USPHS ANNOUNCES PUBLIC HEALTH, SCIENCE PROGRAMS

The U. S. Public Health Service is launching its program of public health training at the graduate school level for health personnel, including dentists and dental hygienists. The program was authorized by Congress as part of the little omnibus health bill, now Public Law 911, and $1,040,000 was appropriated for it in a supplemental appropriations bill sent to the White House in the closing days of the Congress.

An ad hoc committee, which included Philip E. Blackerby, associate general director of the W. K. Kellogg Foundation and a member of the American Dental Association's Council on Dental Education, met August 8 to go over program plans.

Information on stipends, allowances, and submission of applications may be obtained from the Division of General Health Services, U. S. Public Health Service, Washington 25, D. C.

The USPHS also announced the start of a Senior Research Fellowship program. During the first year, 40 to 50 awards will be made to medical and dental schools



The building for the National Institute of Dental Research, whose construction was made possible when Congress this year increased from two to four million dollars the funds available for it, will be located with the other Institutes of Health at Bethesda, Md., at (4) on the map. Construction planned by the Institutes include a residential mental health treatment center (1), road extension (2), a new surgical suite to be attached to the rear of the clinical center (3), a biologics standards building (5), additional animal facilities (6), temporary office buildings, to be converted to animal facilities (7) and a new office building (8).

and to schools of public health for research in basic science. Awards will be for a maximum of $10,000 a year and may be retained for as long as five years. Information may be obtained from the Research Fellowship Program, Division of Research Grants, National Institutes of Health, Bethesda, Md.

NATIONAL BUREAU OF STANDARDS TO BE RELOCATED

A tract of approximately 550 acres near Gaithersburg, Md., has been selected for the relocation of the Washington, D.C., laboratories of the National Bureau of Standards. The move, which is expected to take five years to complete, will make possible replacing present inadequate facilities with modern ones, the Bureau reports. The American Dental Association maintains a Research Division at the Bureau of Standards.

Dental Societies

NEW YORK MEETING TO FEATURE LONG-DISTANCE TV

Long-distance transmission of closed-circuit color television clinics direct from Walter Reed Army Hospital in Washington, D. C., will be a feature of the annual Greater New York Dental Meeting to be held December 3-7 at the Hotel Statler in New York City, announces Roland E. Morse, general chairman.

The TV program will include a gingivectomy performed by Col. Alfred E. Toye, chief of the hospital's periodontics section; preparation of an anterior crown by Lt. Col. Russell H. Augsburger, chief of the restorative dentistry section, and the removal of a cyst by Col. Robert B. Shira, director of the division of dentistry at Walter Reed Army Institute of Dental Research.

Projected table clinics in color will again be part of the program. In addition, a wide range of registered clinics and several audience-participation discussions are planned. A scientific exhibit and a commercial exhibit are adjuncts of the meeting.

FIVE GROUPS COOPERATE IN ORAL CANCER SYMPOSIUM

Five organizations in the health field are participating in the fifth annual oral cancer symposium sponsored by the Utah Division of the American Cancer Society, announces Kenneth L. Dedekind, chairman of the program committee. The Utah State Dental Association has planned the program. Participating with the dental society are the Utah State Dental Association Auxiliary, the Utah State Medical Association, the Veterans Administration Hospital in Salt Lake City and the University of Utah College of Medicine. The cancer program will be October 4 at the Fort Douglas VA Hospital in Salt Lake City.

Essayist is Kenneth C. Sawyer, M.D., of Denver. Dr. Sawyer is a practicing surgeon, teaches at the University of Colorado Medical Center, and is consultant to Fitzsimons Army Hospital and the Veterans Hospital at Grand Junction, Colo. He will discuss cancer of the head and neck, self examination of the breast and oral prosthesis in rehabilitation. A conducted tour of the cancer research center at the University of Utah College of Medicine also is planned.

LOS ANGELES SOCIETY SEEKS DENTAL HEALTH EDUCATOR

The Los Angeles County Dental Society is accepting applications for the position of dental health education coordinator. The coordinator will work with elementary school, secondary school and college staff on problems relating to dental health and with the dental society in its community dental and health programs. A candidate must be 30 to 45 years old, hold a

Master's degree and have had five years' experience in health education. The salary offered is $8,000 to $10,000 a year.

Additional information may be obtained from the Los Angeles County Dental Society, 903 Crenshaw Blvd., Los Angeles 19.

DENTAL PLAN SET UP FOR TWO MASSACHUSETTS UNIONS

The Massachusetts Dental Society has agreed to provide dental health care to the 25,000 members and families of members of two Massachusetts unions. The labor organizations are the Massachusetts Building Industry and Heavy Construction Unions. The program became effective July 1.

The plan provides for comprehensive dental care, with the exception of orthodontics. A fee schedule has been agreed to by the Society and the union's welfare funds. A dentist may charge more than the fees provided for, if the patient will pay the difference. Payments are made directly to the dentist by the welfare funds. Patients have free choice of dentist.

Announcement of the new program was made by Harold E. Tingley, secretary of the dental society.

STUDENTS, SOCIETY COOPERATE IN CHICAGO TV SHOW

Senior dental students will be rounding out their classroom studies this year by participating in a television program sponsored by the Chicago Dental Society. The program, in effect since last April, answers questions on dental health sent in by the television audience. This year, students will provide the answers before the TV cameras. A dental school faculty adviser and members of the society's dental health education committee will help plan the program's format.

The TV program is the second activity sponsored by the society which involves young dentists. Edgar Stephens, secretary of the society's committee on dental health education, reports that the society's industrial examination program each year provides a recent graduate considerable experience in giving examinations. Recently, Dr. Stephens reports, 370 pharmaceutical employees were examined. "A recent graduate often takes more roentgenograms and does more oral examinations in our program than he does in his entire college career," Dr. Stephens states.

DETROIT SOCIETY SPONSORS 13 POSTGRADUATE COURSES

The educational commission of the Detroit District Dental Society announces 13 postgraduate courses and a four day seminar in prosthetics. A number of the courses will be taught by members of the Detroit Clinic Club. Instructors from the Detroit area include Fred E. Fleming, Curtis C. Later, Chester K. Perry, E. S. Smyd, Ralph H. Campbell, Floyd E. Straith, Harold Maxmen, Harold J. Luria, David W. Keats and Robert E. Moyers. Out-of-town instructors include Harry Roth of New York, Jerome M. Schweitzer of New York and Victor H. Sears of Salt Lake City.

Full information on all courses may be obtained from the Detroit District Dental Society, 4421 Woodward Ave., Detroit 2.

Dental Education

MAURICE HICKEY NAMED WASHINGTON DENTAL DEAN

Maurice J. Hickey, head of the School of Dental and Oral Surgery at Columbia University, was appointed dean of the School of Dentistry, University of Washington (Seattle) September 8. He succeeds Ernest M. Jones, first dean of the

Maurice Hickey

school, who died last February. Berton E. Anderson, assistant dean, has been acting dean.

Dr. Hickey, who holds both dental and medical degrees, served on the Columbia faculty since 1945. He had been head of the dental school since 1949.

A prominent oral surgeon, Dr. Hickey is a Fellow of the American College of Dentists, the American Society of Plastic and Reconstructive Surgeons and the New York Academy of Dentistry. He has been a member of committees of the National Research Council and the National Institute of Dental Research. He has contributed to dental research in the fields of cancer, anesthesia and oral surgery.

TWO DENTAL SCHOOLS ADMIT FIRST FRESHMAN CLASSES

Fairleigh Dickinson College at Teaneck, N. J., and The College of Dentistry, Seton Hall University, in Jersey City, admitted their first freshmen this semester. The start of classes brings to 45 the total of dental schools now open in the United States. A forty-sixth, at West Virginia University, expects to admit classes next year.

UNVEIL PORTRAIT OF SHEPPARD FOSTER AT EMORY

On March 20, a portrait of Sheppard W. Foster, former dean of Southern Dental College and former president of Atlanta Southern Dental College, was presented to the Dental School of Emory University. The presentation was made by the S. W. Foster Memorial Fund Committee, composed of Julius M. Davis of Sylacauga, chairman; John C. Carter of Montgomery, and Angus M. Sellers of Birmingham. Funds for the portrait came from 121 dentists.

Dr. Foster was born in Alabama in 1861. He was graduated from the dental department of Vanderbilt University in 1887. In 1895 he became dean of Southern Dental College, a post he held until Southern merged with Atlanta Dental College in 1917. Dr. Foster was made president of the combined school. He served as president until 1944, the year the school consolidated with Emory University. He retired in 1944 and died in 1947.

The former dean was president in 1904 of the National Association of Dental Faculties, predecessor of the American Association of Dental Schools. He was secretary of the Southern Dental Association and was instrumental in combining it with the American Dental Association to form a national organization. In 1926, he served as president of the American Dental Association.

ANNOUNCE TELEVISION, CLINICAL AND SHORT COURSES

California • The University of California Medical Center in San Francisco announces a one day refresher course in orofacial prosthesis. The class will be taught by Charles S. Lipp and Jerome Strain October 27 and will include diagnosis and treatment planning, design and construction of prostheses, materials, cosmetic requirements and evaluation of the restorations.

In addition, the school offers a course in the etiology of malocclusion and rationale of orthodontic treatment November 17 and 18. Gustav Korkhaus of Bonn, Germany, is instructor.

Illinois • Endodontics and periodontics are the subjects of two television courses sponsored by the College of Dentistry of the University of Illinois in Chicago. Ralph Sommer and a staff from the University of Michigan

Three outstanding teachers and researchers retire this year from the Dental School of Western Reserve University in Cleveland. They are: Thomas J. Hill (left), William C. Stillson (center) and William L. Wylie. After retirement, the three men will become professors emeritus. The three were born within 50 miles of each other in Pennsylvania, have had outstanding careers in research and have taught on the same dental faculty. Dr. Hill taught for 39 years, Dr. Stillson for 46 years, and Dr. Wylie, retiring dean of the dental school, for 34. The men were honored recently at a meeting of the Cleveland Dental Society.

will teach "Avoiding the Pitfalls in Endodontics" February 1. Participants are invited to submit problems to be discussed during the presentation. Balint Orban will direct a February 7 course in periodontics designed for the general practitioner.

New York • Morris B. Auerbach will direct a two week course in new developments in the treatment of vital and nonvital teeth beginning January 14 at the College of Dentistry, New York University, in New York City. The lectures and demonstrations will include information from the fields of pathology, bacteriology, pharmacology, roentgenology and restorative dentistry.

Oregon • Thirty-five short postgraduate courses have been announced by the Dental School of the University of Oregon. The postgraduate department is now located in the new dental school building in Sam Jackson Park and will have the use of modern and expanded facilities. Subjects to be taught include oral diagnosis, oral surgery, pharmacology, general anesthesia, applied anatomy and advanced pedodontics.

Southern California • Histopathology of the periodontium will be taught by Balint Orban, assisted by Nathan Friedman, at the University of Southern California, School of Dentistry, in Los Angeles December 10-15. Details on the course may be obtained from the dental school's division of postgraduate instruction.

Texas • The Dental Branch, University of Texas, in Houston, offers a two week course in complete denture construction January 7-9. The course, which is designed for the general practitioner, will be taught by lecture and seminar. In addition, each student will be assigned a patient for whom he will construct complete dentures. A course in periodontics will be taught April 1-5 and will offer students the opportunity to carry out various technics of periodontal therapy. The faculty is Martin Cattoni, professor of periodontics at the school; Helmut Zander, University of Minnesota School of Dentistry; Hans Mühlemann, University of Zurich Dental Institute, and Gunnar Bergstrom of Sweden, at present a visiting professor at the Texas school.

Tufts • Three courses for oral surgeons are offered by Tufts University School of Dental Medicine in Boston. Oral pathology, to be taught Thursday afternoons for eight weeks beginning February 7, is under the direction of Irving Meyer, Gerald Shklar and Irving Glickman. The clinical, roentgenographic and microscopic aspects of oral disease will be presented. Laboratory sessions are planned.

Fred Henny, director of the dental department of Henry Ford Hospital in Detroit, lectures on oral surgery April 25-27. Dr. Henny will discuss diseases of the salivary and lymph glands, the temporomandibular joint, fractures and infections. Modern concepts of drug therapy also will be covered. The third course, intravenous anesthesia for the dental office, is offered March 25-29. Harold Krogh of Washington, D. C., and Adrian O. Hubbell of Long Beach, Calif., will discuss the pharmacology of the barbiturates and the physiology of intravenous anesthesia.

Virginia • Postgraduate courses designed for the general practitioner have been scheduled November through April by the Medical College of Virginia School of Dentistry in Richmond. Included are pedodontics, complete denture construction, oral diagnosis and roentgenology.

Washington • Dental practice administration and management is the subject of a refresher course to be taught November 5 and 6 at the University of Washington School of Dentistry in Seattle. Harry M. Klenda of Wichita, Kan., will teach. The class is limited to 35.

Public Health

DEFENSE DEPARTMENT ENDORSES FLUORIDATION

In a statement issued August 30 the Department of Defense announced its endorsement of fluoridation at military installations where children are in residence. In developing the projects, the Defense Department stated that the advice of appropriate health personnel would be sought. Fluoridation is already in effect at a number of Army, Navy and Air Force bases.

FRANK BERTRAM, TEXAS DENTAL DIRECTOR, DIES SEPTEMBER 1

Frank Bertram, recently appointed dental director for the Texas State Department of Health, died September 1. He was 49 years old.

Dr. Bertram had long service in public health. He had come to his Texas post from a similar one in the Oklahoma State Department of Health. He had been dental director in Oklahoma for 19 years.

During his residence in Oklahoma City, Dr. Bertram was on the visiting staff of the State University Hospitals and was an associate professor of dental surgery in the University of Oklahoma School of Medicine. Dr. Bertram was a past president of the Oklahoma County Dental Society and the American Association of Public Health Dentists.

He held a D.D.S. degree from Washington University School of Dentistry in St. Louis and an M.P.H. degree from the Harvard School of Public Health.

Dr. Bertram is survived by his wife Peggy and a son.

ERMAL O'BRIAN APPOINTED OHIO DENTAL DIRECTOR

Ermal E. O'Brian of Rock Island, Ill., has been appointed chief of the division of dental hygiene of the Ohio Department of Health to succeed Harry B. Millhoff who retired August 1. The appointment was announced by Ralph E. Dwork, M.D., state health director.

Prior to assuming the new post, Dr. O'Brian was with the Illinois Department of Public Health where he served a 21 county region. Previously, he directed dental programs in Illinois for the Lee County Health Department and the Champaign-Urbana Public Health District.

M. M. KESSLER NAMED DENTAL DIRECTOR FOR WASHINGTON

M. M. Kessler of Seattle, chairman of the judicial committee of the Washington State Dental Association, has been appointed chief of dental services in the state department of public assistance, effective August 1. He is the first dentist to hold this post.

The dental portion of Washington's public assistance program will be administered by the Washington State Dental Service Corporation, an organization set up by the state dental society, and similar to the physician-sponsored Washington Physicians' Service, which administers the medical welfare program.

Dr. Kessler is a former vice-president of the Seattle District Dental Society and a member of its executive committee.

ASSOCIATE DENTAL DIRECTOR POST OPEN IN TEXAS

Examinations for the post of associate director of the division of dental health of the Texas State Department of Health have been announced. Two positions for dental hygienists also are available.

The associate dental director will be responsible for providing advisory dental health services in the state-wide program and will help develop a program of dental public health. The salary range is $7,920 to $9,720. Further information may be obtained from the director of the division of dental health, Texas State Department of Health, 410 E. Fifth St., Austin, Texas.

APHA TO DISCUSS PRIVATE FOUNDATIONS IN DENTISTRY

The role of private foundations in dental health will be discussed by the dental health section of the American Public Health Association at its Atlantic City, N. J., meeting November 12-16. On the dental group's panel will be Basil G. Bibby, director of the Eastman Dental Dispensary in Rochester, N. Y.; Philip E. Blackerby, Jr., associate director of the W. K. Kellogg Foundation; Melville Humbert, director of the Community Services Clinic in New York City, and Andrew J. Warren, formerly director of the division of medicine and public health, Rockefeller Foundation.

The dental health section will discuss also dental problems of the chronically ill and the role of the dentist in rehabilitation. Donald J. Galagan of Washington, D. C., is section secretary.

28,543,799 DRINK FLUORIDATED WATER; ALL CHICAGO COVERED

Some 1,256 communities with a population of 28,543,799, were drinking fluoridated water in August, as Chicago, the nation's second largest city, completed fluoridating its water supply. On August 1, the procedure was begun for the north side of the city and 28 suburbs. The program started May 1 for the south side and 24 suburbs.

At the same time, the value of the caries-preventive measure was again demonstrated. The U. S. Public Health Service, reporting on the ten year fluoridation study in Grand Rapids, Mich., said that fluoridation had reduced decay by about 54 per cent in the deciduous teeth of six year olds and by about 60 per cent in the permanent teeth of children born in the city since the program began. In addition, the report stated, "The results suggest that some benefit was obtained by persons whose teeth had already formed or erupted when they started drinking fluoridated water."

A report from Maysville, Ky., where the health procedure has been in effect for five years, states that dental caries in the teeth of children has been reduced as much as 87.4 per cent since the introduction of fluoridation.

In New York, Mayor Wagner reiterated his support for the measure. He assured

representatives of the National Committee to Protect Our Children's Teeth that the question of fluoridating New York's water would be decided, not by referendum, but by the Board of Estimate. A public hearing is to be held in October, the mayor said.

New York City's Department of Health in August issued the results of a survey of legal action after fluoridation in 80 U. S. cities. It showed that in these cities, which have a combined population of over 15 million persons, not a single legal claim had been made charging harm from drinking fluoridated water.

INDICT FOUR LABORATORIES FOR VIOLATING FEDERAL LAW

Indictments were returned September 20 by a federal grand jury against four Chicago mail order denture firms. The firms were charged with violating the Traynor Act, the federal mail order denture law. It was the first indictment under the Traynor Act since the mid-1940s. Chicago is considered the center of the world's mail order denture business.

The indictments, announced by the office of U. S. Attorney Robert Tieken, charged that the laboratories used the mails to send dentures made from impressions or casts taken by persons who were not licensed dentists. The impressions were made in states whose laws forbid the making of dentures without authorization from licensed dentists. The Traynor Act prohibits use of the mails for acts which violate state dental practice laws.

"It is well known by dentists that dental impressions are more or less worthless unless they are made by someone skilled in the technics and knowledge obtained from recognized dental colleges," Mr. Tieken's announcement stated. "It is obvious that the Federal law, as well as the state laws, were enacted because of overwhelming evidence that improperly constructed dentures are in fact injurious to the health of the individuals who use them, whether these individuals realize it or not."

Indictments were returned against Lester B. and Edythe F. Patterson, owners of Clinical Dental Laboratories; Lester Sutker and Eli Sutker, owners of All-State Dental Laboratory; Molly A. May, owner of Chicago Dental Plate Laboratory, and Mary Clyde and Belden Clyde, owners of Tru-Grip Dental Laboratory.

A second suit involving advertising laboratories awaits a decision of the U. S. Supreme Court. Last March, the Illinois Supreme Court upheld an Illinois law prohibiting dental laboratories from dealing directly with the public. The decision was rendered in a suit brought by the Chicago Dental Society against 36 laboratories. The firms appealed the decision.

National Defense

NAME ADVISERS FOR MILITARY DEPENDENTS' HEALTH PLAN

Two representatives of the American Dental Association have been named to the new Health Plan Advisory Committee created by the recently enacted law providing health care for the dependents of military personnel. Invited to serve on the committee by Frank B. Berry, M.D., assistant secretary of defense for health and medical affairs, are Harry Lyons, Association president-elect, and William R. Alstadt, Trustee for the Twelfth District.

Other organizations represented on the committee include the American Medical Association, American Hospital Association, American Academy of General Practice, American College of Physicians, American College of Radiology, American College of Surgeons, Blue Cross, Blue Shield and other private insurance companies.

The military dependents' health care bill provides civilian medical and hospital

services for the families of servicemen but limits dental care to emergency treatment except in overseas areas or remote sections of the United States.

The program is to go into effect December 8.

LADIES' GROUP DONATES FUNDS FOR ARMY DENTAL EQUIPMENT

The Daughters of the U.S. Army in Fort Benning, Ga., have donated $500 toward the purchase of new orthodontic equipment for Fort Benning's Dental Detachment. The equipment will be used by the Third Army Orthodontics Center on the post, which is one of the few Army posts to provide orthodontic treatment. Funds will be applied to the purchase of an electrolytic polishing bath, a clinical camera and photographic lighting unit, storage boxes for record models and several smaller items.

Rear Admiral Daniel W. Ryan (DC) USN (left), Inspector, Naval Dental Activities, Pacific Coast, recently was presented with the Order De Vasco Nunez De Balboa in the rank of Commander. The award was made by Luis D. Cresbo (right), Consul General of the Republic of Panama, in a ceremony held in San Francisco. Admiral Ryan was decorated for having promoted understanding in dentistry between the United States and the Republic of Panama. Last year Admiral Ryan was made an honorary member of the Panamanian Odontological Society.

Admiral DeFord

NAVY NAMES CLIFFORD DEFORD TO POST OF REAR ADMIRAL

The Navy Dental Corps on August 1 promoted Capt. Clifford Conrad DeFord to the grade of Rear Admiral. At the time of his selection Captain DeFord was en route to the United States from Pearl Harbor where he had been commanding officer of the Navy dental clinic.

The new Rear Admiral received his dental degree in 1927 from the College of Dentistry, University of Nebraska. He was commissioned in the Navy Dental Corps in 1929 and advanced through the ranks to the post of captain in 1943. Captain DeFord has the American Defense Service Medal with star; the European-Africa-Middle Eastern Campaign Medal; the American Campaign Medal; the World War II Victory Medal, and the National Defense Service Medal.

TWO SESSIONS FOR DENTISTRY AT MILITARY SYMPOSIUM

Two special sessions have been assigned to dentistry at the Seventh Annual Military-Medico-Dental Symposium for the Armed Forces to be held at the U. S. Naval Hospital in Philadelphia October 22-27. The dental program will be October 23 and October 27 and is under the co-chairmanship of Col. Thomas P. Fox (DC) USAR and Cmdr. Milton Rode (DC) USNR.

On the program are: Capt. Clay A. Boland (DC) USNR; Herbert K.

Cooper, member of the State of Pennsylvania Health Advisory Board; Jack Alloy, Philip Gross, Daniel Isaacson, Morton Amsterdam and Julio Asturias, of the faculty of the University of Pennsylvania.

One retirement point credit will be given reservists for each day of attendance.

International

EUROPEAN RESEARCH GROUP ELECTS H. R. HELD PRESIDENT

H. R. Held of Switzerland has been elected president of the European Society for Fluorine Research and Caries Prevention. Some 71 members from 16 countries participated in the June 8 meeting. Also elected were H. Hauser of Germany and M. Joachim of Belgium, vice-presidents; H. J. Schmidt of Germany, executive secretary, and H. Leonhardt of Austria, secretary.

Treasurers are D. Backer-Dirks of The Netherlands and D. Palfer-Sollier of France. The Council on Research is L. J. Baume, Switzerland; P. D. Cremer, Germany; A. J. Held, Switzerland, and D. Quentin, Germany.

DENMARK HONORS AMERICAN ORAL SURGEON HAROLD KROGH

Harold W. Krogh, oral surgeon of Washington, D. C., and chairman of the American Dental Association's section on anesthesiology, has been awarded the Knight's Cross of the Royal Order of Dannebroge by his Danish Majesty King Frederik IX. Dr. Krogh, who has lectured and taught in Scandinavia, and who is of Danish descent, was cited for his services to Denmark.

Dr. Krogh is well known in the United States. He is civilian consultant to the Army, Air Corps and to the National Institute of Dental Research. He has been connected with Episcopal Hospital, Emergency Hospital and George Washington Hospital as well as with the George Washington Medical School.

He has served as chairman and secretary of the Washington, D. C., section of the International Association for Dental Research, is a Fellow of the American College of Dentists and of the American Association for the Advancement of Science. He is a member of the American Society of Oral Surgeons and of the Washington Academy of Medicine.

DR. SCHUCHARDT ELECTED TO HEAD GERMAN ORAL SURGEONS

Dr. Schuchardt of Hamburg has been elected president of the German Society for Orthodontics and Facial Surgery, it was announced August 1. Elected vice-president was Professor Steinhardt of Bremen. The new executive secretary is Fritz Schön, M.D., of Bad Reichenhall, and the treasurer is Eduard Schmid of Stuttgart.

ARGENTINE SOCIETY PLANS THREE DAY NOVEMBER PROGRAM

The Asociacion Odontólogica Argentina announces that its third dental jornadas (meeting) will be November 5-7 in Bahía Blanca. The Jornadas will be held in cooperation with the Círculo Odontológico of the National University of Southern Argentina, the Naval Hospital and the Base of Puerto Belgrano, where the clinical sessions will be held. A social program is planned in addition to the scientific session.

Carlos Waissbein is president of the Jornadas organizing committee. Information on the meeting may be obtained from Antonio Calle Guevara, president, or José Manuel Lueje, secretary, Asociacion Odontólogica Argentina, Junín 959, Buenos Aires, Argentina.

F.D.I. CONDEMNS SALES DRIVE FOR FLUORIDE DENTIFRICES

The Fédération Dentaire Internationale at its May 28 to June 3 meeting in Zurich condemned the world-wide advertising campaign currently being carried on by manufacturers of the so-called therapeutic dentifrices. Pointing out that the claims made for the tooth pastes were based on "inadequate scientific evidence," the F.D.I. resolution urged member associations to take the necessary steps "to prevent the exploitation of the public in matters of health."

The resolution warned that the advertising of unsupported claims for prevention of dental disease "minimizes the importance of such fundamental measures of prevention as suitable diet, regular dental care, established oral hygiene practices, and other recognized measures to combat dental disease."

Major promotional campaigns have been carried on recently in the United Kingdom and the United States as well as in other countries.

SPECIAL STUDENT FACILITIES AVAILABLE AT ROME CONGRESS

Special housing facilities are available for students who wish to attend the Twelfth International Dental Congress of the Fédération Dentaire Internationale in Rome September 7-14, 1957. The Congress organizing committee has secured several thousand beds at student hostels at reasonable rates. Arrangements have been made also for four camping sites, three of them close to the Universal Rome Exhibition buildings, where the Congress will be held.

Reduced registration fees may be obtained by all persons who register before January 1. The student rate is 1,500 Lire (about two dollars). Registration forms may be obtained from Pio Lalli, general

The Twelfth International Dental Congress of the Fédération Dentaire Internationale will be held in Rome September 7-14, 1957. The Palazzo di Congressi (above) will house part of the sessions. Reduced registration fees are available to those who register before January 1, 1957. Information on the Congress may be obtained from Pio Lalli, general secretary, Via Boezio 16, Rome.

secretary, Via Boezio 16, Rome. Travel arrangements may be made through C. W. Carrick, travel consultant, Oberlin Bank Bldg., Oberlin, Ohio.

F.D.I. OFFERS HELP TO WHO ON FLUORIDATION

The Fédération Dentaire Internationale has offered its help to the World Health Organization in promoting fluoridation. In a letter to the world health group, the F.D.I. called attention to an item in the WHO 1957 budget which provides for the setting up of pilot fluoridation plants in Latin America. The WHO program is designed to demonstrate methods of fluoridation to water supply and health service engineers. The F.D.I. suggested that WHO invite an F.D.I. observer to meetings called to implement the fluoridation program.

General

LAWYERS MOBILIZE FOR JENKINS-KEOGH BILL

Local action committees are being organized by the American Bar Association in support of a new proposal to permit the setting up of retirement funds by the self-employed. The measure, similar to the 1955 Jenkins-Keogh bill endorsed by the American Dental Association, is to be introduced into Congress when the 85th session starts in January. It would allow a self-employed person to deduct from his yearly income a limited tax-free amount to be placed aside in a retirement fund. Taxes would be paid when the individual retired and began collecting his pension.

A pamphlet sent out by the bar association to its members points out the inequity of present tax laws. Such laws help people retire who work for others by favoring corporation retirement plans, the pamphlet points out. "When we work for ourselves we are denied equivalent assistance," it says.

DENTIST ONE OF THREE CITED BY HOSPITAL ASSOCIATION

Emory W. Morris of Battle Creek, Mich., president and general director of the W. K. Kellogg Foundation and the first chairman of the American Dental Association's Council on Dental Health, was one of three men cited September 19 by the American Hospital Association. Honorary membership in the hospital group was conferred on Dr. Morris, George F. Lull, M.D., general manager of the American Medical Association, and on Theodore G. Klumpp, M.D., president of Winthrop Laboratories and chairman of the Medical Services Task Force of the Second Hoover Commission.

Dr. Morris received his dental degree from the School of Dentistry, University of Michigan. He joined the Kellogg Foundation in 1933 as director of dental education and has been with the Foundation since then.

SCHOLARSHIP FUND ENDOWED BY TRADE ASSOCIATION

A $50,000 student loan fund for senior dental students and a fellowship program for senior students who wish to teach have been set up by the American Dental Trade Association.

One senior student in each of the dental schools of the United States and Canada will be eligible each year for a $350 loan to help complete his education. No interest will be charged for the loan

until the September after graduation, at which time the interest will be 3 per cent. Deans of the schools will select the students to be granted loans.

The board of directors of the Fund for Dental Education, a group set up recently by the American Association of Dental Schools, will select the student to receive the $2,500 fellowship in basic science.

ORTHODONTISTS TO AWARD $500 IN ESSAY CONTEST

The American Association of Orthodontists has announced an essay contest. A first prize of $500 will be awarded for the winning essay. Essays must describe an original investigation which contains new material of value to orthodontics. Honorable mention will be awarded to authors taking second and third place. The top three papers will be published by the Association, and the author of the winning essay will be invited to present it at the New Orleans meeting May 13-16, 1957.

Essays must be submitted in triplicate before January 10. Details on the contest may be obtained from Alton W. Moore, chairman, research committee, American Association of Orthodontists, University of Washington School of Dentistry, in Seattle.

PAIN IN DENTISTRY IS TOPIC OF DECEMBER SEMINAR

The problem of pain in dentistry is the topic of the third annual seminar of the Rowe Smith Memorial Foundation to be held December 2-5 at Caddo Lake, Karnack, Texas. James W. Clark, member of the Foundation's executive council, announces that the program will include a study of the anatomy and physiology of dental pain as well as pain associated with structures of the head and neck.

Essayists are: Stewart Wolf, M.D., professor of medicine, University of Oklahoma, School of Medicine, and Ruth Moulton, M.D., assistant clinical professor of psychiatry, Columbia University. Emanuel Cheraskin, M.D., D.M.D., University of Alabama School of Dentistry, will serve as moderator.

ROUND TABLE FORUM IS PART OF DENTAL MEDICINE MEETING

A round table forum will be part of the annual meeting of the American Institute of Dental Medicine to be held in Palm Springs, Calif., November 4-8. Panelists will be Francis L. Chamberlain, associate clinical professor of medicine at the University of California in San Francisco; Milton B. Engel, associate professor of orthodontics, College of Dentistry, University of Illinois in Chicago; Donald A. Kerr, professor of oral pathology and periodontology, School of Dentistry, University of Michigan; Helmut Zander, professor of periodontology, School of Dentistry, University of Minnesota in Minneapolis and S. I. Hayakawa of San Francisco, author of *Language in Thought and Action*.

The round table will be preceded by papers presented by the panelists. The discussion will be on the application of the essayists' topics to the practice of dental medicine. Registration may be obtained from the executive secretary of the Institute, Miss Marion G. Lewis, 2240 Channing Way, Berkeley 4, Calif.

PROFESSION INVITED TO ORAL PATHOLOGY LECTURE

Members of the medical, dental and allied professions have been invited to the December 17 meeting of the New York Institute of Clinical Oral Pathology. Theodor Blum, Institute secretary, announces that the meeting will be at the New York Academy of Medicine building.

Essayist is Albert Schatz, Ph.D., director of research and professor of micro-

biology, National Agricultural Colleges, Doylestown, Bucks County, Pa. Dr. Schatz will discuss the etiology of dental caries. Discussers are J. L. T. Appleton, professor of microbiology, University of Pennsylvania School of Dentistry, and Seymour H. Hutner, Ph.D., microbiologist, Haskins Laboratories, New York City.

HISTORY OF ORAL SURGERY IS TOPIC OF OCTOBER MEETING

"The History of Oral Surgery, the Oldest Specialty of Dentistry," will be the topic of the Fifth Herman L. Reiss Memorial Lecture to be held October 29 in New York City. The essayist will be Kurt H. Thoma, professor emeritus of oral surgery and oral pathology at Harvard University. The meeting is sponsored by the New York Institute of Clinical Oral Pathology, Inc. All members of the dental, medical and allied professions are invited to attend.

BETH ISRAEL SPONSORS PERIODONTICS SEMINAR

A two weeks' seminar in periodontics is scheduled to begin November 5 at Beth Israel Hospital in Boston. Theory and technics of periodontal therapy will be covered. The course will include etiology, diagnosis and treatment of various diseases. Periodontal pocket therapy as well as over-all mouth rehabilitation will be discussed. The course will be directed by Henry M. Goldman and Bernard Chaikin. Further information may be obtained from the director of public relations and education at the hospital.

BRONX HOSPITAL ANNOUNCES INTERNSHIPS, RESIDENCIES

The Department of Dentistry of the Bronx Municipal Hospital Center, Albert Einstein School of Medicine, in the Bronx, New York, announces that four dental internships and four residencies in oral surgery will be available for the year beginning July 1957. Application for approval of the internships and residencies has been made to the American Dental Association's Council on Dental Education.

Information on the hospital's programs may be obtained from the dental department, Bronx Municipal Hospital Center, Pelham Parkway South and Eastchester Road, Bronx 61, before December 1.

INTERNSHIPS, RESIDENCY AVAILABLE AT MOUNT SINAI

The dental and oral surgery service of Mount Sinai Hospital in New York City is accepting applications for internships and a residency for the year beginning July 1957. Selections are usually made in December. Applications may be addressed to Max Fuchs, assistant director, at the hospital in New York.

Nearly 400 people paid tribute to Fred A. Richmond of Kansas City, Kan., July 28 at a testimonial dinner held at the Town House in Kansas City. Dr. Richmond (center) has served 28 years as secretary of the Kansas State Dental Association and has held high posts in local and national organizations as well. Among the prominent guests were Brig. Gen. Leigh C. Fairbank (left), retired commander of the Army Dental Corps, and Frederick C. Elliott, M.D., (right), executive director of the Houston (Texas) Medical Center. Walden W. Wickham of Kansas City and Frank C. Carothers of Garnett were co-chairmen of the testimonial committee.

FOUR ANNIVERSARIES MARKED BY SENIOR DENTIST IN JULY

B. A. Wright, Sr., of Latrobe, Pa., celebrated four anniversaries July 27. It was Dr. Wright's 60th anniversary of his membership in the national and state dental societies and in the Odontological Society of Pittsburgh. It was also Dr. and Mrs. Wright's 60th wedding anniversary. The day before had been Mrs. Wright's 82nd birthday; the next day was Dr. Wright's 91st.

Dr. Wright has practiced dentistry for 66 years. His son, B. A. Wright, Jr., practices with him. The senior dentist and his wife were honored on the occasion of their anniversaries by the Thomas B. Anderson Chapter of Royal Arch Masons at a testimonial dinner in Ligonier, Pa.

AFL-CIO PLEDGES FUNDS FOR NEW JERSEY DENTAL CLINIC

AFL-CIO officials of New Jersey have pledged $7,000 toward the establishment of a free dental clinic in Camden, N. J., for the area's handicapped children, according to the February issue of *The Journal of the Southern Dental Society of New Jersey*. The clinic will be set up at Camden Municipal Hospital and will be under the direct supervision of Milton B. Asbell, associate dentist of the Children's Hospital of Philadelphia. Also on the staff will be Henry Wisniewski, Paul Zackon, Marvin Silver and Robert I. Kaplan.

Equipment includes a mobile dental unit which will be used for bedridden patients.

Also • A Museum of History and Technology, authorized by Congress, will include a Hall of Dental History. Expected completion is 1960. The museum will house materials now shown in the Arts and Industries Building of the Smithsonian Institution. Members of the American Academy of the History of Dentistry have been asked to help with plans. . . . Diet-conscious Americans have cut candy consumption considerably, reports *Financial World*, July 18. Per capita consumption was 16.6 pounds in 1955; 20.5 pounds in 1944. . . . Bion R. East of Plainfield, N. J., professor emeritus of dental public health practice at Columbia University, is on the planning committee for the 1957 National Health Forum. Forum topic, to be presented March 20-22 in Cincinnati, is mental health. The American Dental Association is a National Health Council member. . . . Dentists have been warned against solicitation of funds by Toys of the World. A federal Grand Jury in Brooklyn August 6 indicted the firm on charges of using the mails to defraud. . . . The two day course in practice management of the Michigan Academy of Dental Practice Administration is scheduled October 20 and 21 in Detroit. . . . December meetings include: Pan American Odontological Association, December 5, New York City; American Academy of Dental Medicine and Greater New York Academy of Prosthodontics, both December 2, New York City; fraternities Alpha Omega, December 2, and Sigma Epsilon Delta, December 5, New York City.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

TRAINING IN HYPNODONTICS

Recently, criticisms of the use of hypnodontics have appeared in some dental journals. Much of this criticism as it relates to inadequate training of both dentists and instructors, as well as to indiscriminate and uncontrolled use, is merited, but blanket disapproval and condemnation of the procedure itself is unwarranted.

Recognizing these dangers, the American Society of Psychosomatic Dentistry emphasizes the careful and thorough training of both instructors and dentists. Its constitution requires that instructors be highly qualified and contains rigidly codified principles for the teaching and use of hypnosis in dentistry.

Forty hours of didactic and clinical work, we find, is adequate for training. Study groups include no more than ten trainees. Whether the 40 hours are given in the course of a year or within a shorter time is a less important matter than is the quality of training. The difference between the so-called 3-day seminars, which are not seminars but are study groups of 100 to 150 people, and a course of instruction specifically adapted for a group of ten trainees has been obvious to men who have studied with both groups.

Small study groups do obtain the intensive training through personalized instruction which is impossible with a large group. We condemn the wholesale teaching of hypnodontics. In any study group, large or small, every trainee cannot be expected to interpret correctly the philosophies given him. Because of this, we believe every trainee should be given personal attention by his instructor in the trainee's office with his own patients. This individualized guidance, in conjunction with the availability of the instructor for consultation, advanced group study and workshops, make hypnodontics a safe and useful procedure in dentistry.

Rigid limitations are established by the American Society of Psychosomatic Dentistry so that hypnosis is used for relaxation and anesthesia only. The hypnodontist should never regress his patient, should never remove habits, whether they are thumbsucking or bed wetting. Should a physician ask a dentist to use hypnotic technic to assist a delivery, the dentist must refuse. Should a patient ask his dentist to use hypnosis for weight reduction or as assistance in stopping smoking or for curing alcoholism, his dentist must refuse. He should never use hypnosis for analysis or for any other form of psychotherapy. In brief, he is a dentist, not a psychiatrist or psychotherapist.

When hypnosis is used as an anesthetic, there is nothing interpersonal between the operator and the patient. Use of the transference stage in hypnodontics is nil. Patients have confidence in their dentists for pain relief only. They do not develop the strong dependence on the therapist characteristic of psychotherapy. After anesthesia is induced, the dentist performs only dental procedures and dismisses his patient when dentistry is completed. There is a clear distinction between the use of hypnosis for solving life's problems and the use of suggestion for elimination of fears and other psychological symptoms pertaining to dentistry and pain relief. Any qualified dentist, even if he does have unsolved personal problems, can use these procedures, just as any physician in the same circumstances treats his patients routinely. Hypnodontics is a stereotyped procedure limited to only one goal, which is anesthesia by suggestion.

Many psychiatrists' conception of hypnosis in dentistry is based on their knowledge of hypnosis in deriving material from the minds of deeply disturbed persons. A properly oriented dentist will not attempt to obtain such material. As long as he uses hypnosis only for pain relief, it should make no difference what complexes the dentist has. There is no more need for analysis of trainees in hypnodontics than there is for analysis of dentists for surgery, orthodontics or any other procedure.

Many people are deathly afraid of a needle or are gaggers. Administration of routine local anesthetics is virtually impossible and general anesthesia is not always available or desirable. Experience with several thousand patients has

shown that in these people hypnodontics is remarkably satisfactory, easy to administer and without unfavorable results.

In summary:

(1) Instructors and teaching technics, under constant surveillance, are developing high standards. (2) Unreasonable theoretical restrictions should not be permitted to prevent ethical dentists from learning new technics. (3) Hypnodontics provides an easily available, safe anesthetic.

Philip Ament, Buffalo, examiner for and instructor accredited by the American Society of Psychosomatic Dentistry

ANTIHISTAMINE IN ORAL SURGERY

Practicing dentists, confronted by problems in treating patients, conceive many theories and innovations that might benefit the dental profession. Yet, these dentists are handicapped in that laboratory facilities to test their ideas are lacking.

Rather than allowing these theories to die, practitioners could serve best by making their ideas known so that researchers with proper facilities could prove, improve upon, or disprove their worth. Practical research would result from stimulation by men who face the actual problems routinely.

An instance in which the suggested procedure would be of value is the systemic use of antihistamines in oral surgery to promote healing by the blocking of the effects of trauma-induced histamine. Edema is minimized, bleeding is reduced, more comfort is assured the patient, and healing has been reported to be more rapid.

After cyst removal, extraction of impacted teeth and similar surgery, many operators insert surgical dressing into the void. The dressing usually consists of a petrolatum base and benzocaine as the topical anesthetic. It might do well to investigate the possibility of using a topical antihistamine either combined in surgical dressing or used in ointment form. Antihistamine creams and ointments are widely used topically by the medical profession, and it is possible that their proper application in the oral cavity may have merit.

The speed of the antihistamine's release from the dressing might be controllable so that long-acting qualities could be realized. The proper concentration, side effects that might occur and degree of benefit are several other questions the answers to which are difficult or impossible to determine accurately in the dental office. Again, qualified research in a field suggested by a practicing dentist might benefit the entire profession.

Jerome S. Mittelman, New York

CARIES AND DIET OF THE SALASAKE INDIANS

I read with great interest in recent issues of THE JOURNAL an article on prevention of dental caries by Kesel and the comments by Neumann. Ecuador in South America offers an excellent opportunity for comparative caries studies. Many different tribes and racial strains are living here on diets that vary greatly from one region to another; some of the tribes still maintain their traditional food habits.

In some regions the food is soft and includes much fish, rice, bananas and soft bread; here the caries rate is exceedingly high. The situation improves in the interior where more corn, meat, beans and yuca are consumed.

By far the best dental conditions, usually a complete absence of caries, are encountered among those tribes which consume the hardest food, especially the Salasakes. These Indians do not use toothbrushes or tooth paste. Since other racial strains and mixtures in the same region and on the same drinking water but on different diets, suffer greatly from decay, I am sure that the water can be excluded as an influential factor.

The chief staples among the Salasakes are bread and corn, a diet to which I attribute the decisive influence. Their bread, called machiba, is made from the flour of roasted grain, and it is harder by far than any European bread. An important staple is roasted maize which is incredibly hard. It seems difficult to conceive that human teeth can crush and grind these stonelike kernels. To the Indians no effort seems to be involved. The molars act as real crushing tools, a function almost forgotten in modern man. The Salasakes do not eat only at their mealtime, but they chew their toasted maize throughout the day. One also often observes these Indians using their teeth as tools; they are able to lift heavy loads with the aid of their teeth.

The heavy use does not remain without side effects, and in older Salasakes the teeth are often ground down to the gingiva. The secondary dentin is much harder than would usually be found elsewhere, and even the gingiva is of leathery toughness.

In sum, it seems less the type of diet than the texture that is of decisive influence. Incidentally, the Salasakes consume a kind of syrup made from corn, with apparent impunity.

Whatever the importance of the chewing load on caries immunity, it certainly is not the only factor at play; however, I fully concur with Neumann in attributing to this factor a prominent role and in giving it serious consideration in the debated prevention of caries.

Teodoro Dobkowsky, Guayaquil, Ecuador

EARLY DENTAL CONTRIBUTION TO ANTIBIOTICS

The development of the field of antibiotics is generally viewed as an integral part of medical research; some credit is given to contributions from bacteriology, plant pathology and soil microbiology. In dentistry, antibiotic agents are now widely used prophylactically and therapeutically. Antagonistic interrelationships among oral microorganisms are receiving increasing attention. However, it is generally assumed that the dental profession has merely applied antibiotic therapy on the basis of discoveries that originated in other areas of research.

Actually, dentistry can legitimately claim an early and important, but almost completely overlooked, contribution to the understanding of microbial antagonisms and antibiotics. The following quotation from page 234 of H. P. Pickerill's book *The Prevention of Dental Caries and Oral Sepsis* published by Bailliere, Tindall and Cox, London, 1912, proves this:

The Inoculation of the Mouth with Other Organisms

The mouth might be inoculated* with the definite purpose of . . . introducing organisms which should exert an antibiotic effect upon the established organisms. . . .

". . . although the forces of antibiosis are known to exist—in fact, must exist—in the mouth to a very large extent, it seems (at present) to be the rule that 'pathogenic' organisms are the ones which are crowded out or succumb, and that the organisms of caries are the ones which survive. We do not yet know enough about the biological characters of mouth organisms alone or in combination, in the mouths of immune individuals and of susceptible individuals, to be able to say which, if any, are inimical to the acid-forming group responsible for the primary decalcification of enamel; or whether any organisms exist which, if introduced into the mouth, could be induced to establish themselves and exert such an action. This is a subject which will probably be shown to have possibilities when it is thoroughly worked out."

The word "inoculate" is used here, not to mean hypodermic inoculation, but simply the insertion of organisms in the oral cavity preferably by their being rubbed between the teeth."

The years that were "wasted" between the discovery of penicillin in 1929 and the subsequent appreciation which developed for this agent specifically and for antibiotics generally are often lamented. One also encounters estimations of how many lives might have been saved had research on penicillin been vigorously pursued immediately after its discovery.

But similar circumstances attend Pickerill's contribution. For, in 1912, 17 years before the first publication on penicillin, Pickerill clearly and unequivocally pointed out the potential importance of microbial antagonisms and antibiotic relationships. This was not only a dental concept, but also an historically early publication on antibiotics. Although Pickerill was concerned primarily with dental caries and oral sepsis, his ideas were broadly applicable in principle to many infectious diseases.

The need for effective antibacterial agents to control wound infections in World War II, which occurred some ten years after Fleming's original report, reawakened interest in penicillin and motivated research on antibiotics. World War I, unfortunately, did not accord a similar recognition to the importance of Pickerill's 1912 contribution. If the decade of comparative indifference extending from the discovery of penicillin to its exploitation is regrettable, then the 17 years which elapsed between Pickerill's publication and the first paper on penicillin is also regrettable. Had Pickerill's concepts been taken seriously in 1912 and followed up at that time, the entire history of the chemotherapy of infectious diseases might have been different.

Albert Schatz, Ph.D., Doylestown, Pa.

CAPTION IN KESEL'S ARTICLE

In reference to the article of Robert G. Kesel which appeared in the April issue of THE JOURNAL entitled "Methods of Prevention and Control of Dental Caries," the following caption found on page 461 seems somewhat misleading. "Fig. 3. Early caries in occlusal pits properly treated."

It seems to me that Black's rule of extension for prevention is the logical procedure for occlusal defects. Roentgenograms in Dr. Kesel's article indicate a mere pit filling. Since when have pit fillings on occlusal surfaces been "proper"?

Heinz Gronau, D.D.S., Middletown, Conn.

DR. KESEL'S REPLY

The photograph on page 461 of the April issue of THE JOURNAL does not minimize the importance of extension for prevention. Cavity margins should be placed in self-cleansing regions. In early occlusal pit caries, this can be done without cutting through the ridges and involving the entire occlusal surface, as illustrated. In fissure caries, more extensive preparation is required. The anatomy of the region should determine the amount of extension necessary.

Robert G. Kesel, D.D.S., Chicago

Book Reviews

NEW AND NONOFFICIAL REMEDIES 1956

By the Council on Pharmacy and Chemistry of the American Medical Association. 546 pages. Index. $3.35. Philadelphia, J. B. Lippincott Co., 1956.

The 1956 edition of *New and Nonofficial Remedies (NNR)* reflects the recent decision of the Council on Pharmacy and Chemistry to discontinue its policy of "accepting" commercial products. The Council now only "evaluates" drugs and certain therapeutic adjuncts. The 1956 *NNR* is about 15 per cent smaller than the 1955 edition, primarily because the listing of accepted products has been omitted.

In the 1956 edition, the chapters of interest to dentists have been brought up to date. The book retains its traditional character and general format. It contains descriptions of useful official drugs which have become available during the past 20 years and useful nonofficial drugs regardless of the time they were introduced. Its emphasis is on therapeutics rather than on pharmacology.

The specialized scope of *NNR* permits excellent coverage of those aspects of drugs which are of most immediate value to the practitioner.

The current edition should be in all personal and institutional dental libraries. The low price of the book makes the purchase of each edition financially attractive.

Donald A. Wallace

THE PONTOSTRUCTOR METHOD FOR THE CONSTRUCTION OF FIXED BRIDGES, CROWNS AND INLAYS

By Sam Karlstrom, D.M.D. Translated by Victor Braxton. 266 pages with 179 illustrations and tables. $6.50. Stockholm, A. B. Fahlcrantz' Boktryckeries, 1955.

In the preface, the author states his philosophy and approach to rationalization, standardization and simplification of dental operations and laboratory technics. His premises, at times, are widely different from those accepted and taught in this country but are worthy of our consideration. When the pendulum here swings in the opposite direction, truth might be on his side.

The subject matter, one of importance, is handled adequately. Some of the information was new to this reader, especially the repair technic described in Chapter 12.

Although the material is well organized, the style makes some rereading necessary. The illustrations and charts are good, and the case histories would seem to verify the claims of the author.

The materials, instruments and equipment to which the author refers are largely unfamiliar to the American reader.

The physical properties of the book—type, make-up and paper—are satisfactory. The paper binding lowers the cost sufficiently to create a larger group of readers.

John F. Johnston

THE ANATOMY OF THE HEAD AND NECK

By Barry J. Anson, Ph.D. 101 pages with more than 100 drawings. Index. $6.50. Philadelphia, W. B. Saunders Co., 1956.

Dr. Anson combines unusual judgment as a teacher of anatomy with special gifts in medical illustration. The pages of this atlas are filled with drawings and plates which will make the three dimensional relationship of the head and neck easier for the dental student to comprehend. Color has been used effectively wherever it can add to or emphasize special points or explain the relations between adjacent structures. The labeling not only is complete but exceptionally large and plain. Fine paper helps bring out the quality of the illustrations and emphasizes the effectiveness of the colored structures. This is a worthwhile book for the dentist as well as for the dental student.

John A. Cameron

DERMATOLOGIE DER MUNDHÖHLE UND DER MUNDUMGEBUNG. (DERMATOLOGY OF THE ORAL CAVITY AND ITS SURROUNDINGS.)

By Aloys Greither. 262 pages with 191 illustrations. Index. DM. 39.60 ($9.45). Stuttgart, Georg Thieme, 1955.

The author, in his introduction, properly points out that the diseases of the oral cavity and its surroundings are not limited to a single discipline. A perusal of the table of contents makes it clear that this book covers a wide range of material which should prove of in-

terest to the dermatologist, dentist, maxillofacial surgeon, the oncologist, otorhinolaryngologist, as well as to the internist.

There are 15 chapters in all, of which the first three are more general and deal with general anatomicophysiologic considerations, efflorescences of the oral mucosa and anomalies and variations. The next is an extensive chapter on infections, including specific, nonspecific and generalized types, and virus and fungus diseases. There follow in sequence considerations of the vesicular diseases, the dermatitis-eczema group, diseases involving pathologic cornification (psoriasis, pityriasis, and others), connective tissue diseases, disturbances of pigmentation, metabolic diseases and neoplasms. The final chapters consider briefly traumatic injuries, the oral cavity as the mirror of internal or general diseases, side effects of drugs and oral dermatoses of occupational origin.

Each chapter and sometimes sections of longer chapters are well-documented by groups of pertinent references. A few of the classical accounts are mentioned, but the majority of the references cover the period from 1950 to 1955 so that the reader who wishes to develop a bibliography on any particular phase of the literature is given an excellent point of departure. The emphasis is upon German works, although a few French and Italian as well as numerous papers in English are cited.

Especially noteworthy is the splendid quality of the halftone photographs of patients and the photomicrographs. Although no color is used, the photographer's careful attention to focus and lighting and the publisher's use of a fine screen process on high quality smooth paper combine to give reproductions of startling crispness and clarity.

Vernon E. Krahl

MEDICAL SUPPORT OF THE ARMY AIR FORCE IN WORLD WAR II

By Mae Mills Link, Ph.D., and Hubert A. Coleman, Ph.D. 1,027 pages with illustrations. Index. Glossary of military terms. $7. Washington 25, D.C., Superintendent of Documents, U.S. Government Printing Office, 1955.

Medical Support of the Army Air Force in World War II was prepared to fill a gap in the medical history of that period. It is fundamentally a reference book. The 11 chapters deal with the origin of the Air Force Medical Service and the issues leading up to the war, the schools established, the research stimulated, the support made available in the various theaters of combat, the problems special to aviation medicine and finally the support of the long range bomber program, the defeat of Japan and the end of the war.

The "Postscript" relates the success, postwar, of the little group of air enthusiasts who favored a separate Air Force. By 1946, the soundness of an independent Air Force was generally recognized and three years later the USAF Medical Service was established. Aero medical research was developed so that at the beginning of World War II a systematic aero medical research program separate from traditional clinical research activities was in existence. The war provided the proof of the wisdom of an independent Air Force medical service. There are within the profession many men whose unselfish devotion to duty contributed to the knowledge which has made this volume possible. They will find it satisfactory reading as well as a valuable reference volume.

R. M. Walls

THE DIABETIC'S COOKBOOK

By Clarice B. Strachan. 304 pages. Index. $6.50. Houston, Texas, University of Texas Press, 1955.

The *Diabetic's Cookbook* can be a most helpful aid in introducing variety and flexibility into the prescribed diet.

The author has given full recognition to the Exchange List which is the work of the American Diabetic Association, American Dietetic Association and the U. S. Public Health Service and which simplifies calculations of diabetic diets.

The book is divided into 14 parts. Six of these correspond to the Exchange List. Recipes for these six sections include those recipes most closely related to the Exchange List itself either with reference to the food value of the chief ingredient or with regard to comparable diet exchange. The remaining eight parts include recipes that may be closely related to any of the six exchanges.

The book is well organized. It answers very simply many questions regarding meal planning. It reduces the mathematics of the diabetic diet to a minimum.

Persons with diabetes and their families will welcome this publication which assembles in one volume the materials vital to meal planning for both a varied and an adequate diet.

Pearl S. Camstra

Current Literature

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FURTHER OBSERVATIONS ON THE EFFECT OF TOBACCO ON EPITHELIAL TISSUES OF VITAMIN-DEFICIENT MICE

Seymour J. Kreshover, p. 798.

In order to investigate vitamin B deficiency as a factor contributing or predisposing tissue to susceptibility to tobacco, a total of 201 Swiss strain mice were studied. By means of a specially designed apparatus, whole smoke applications were made to the ears of 170 mice rendered deficient in various components of the B complex (riboflavin, pyridoxine, pantothenic acid, thiamine, biotin and niacin).

Each of these animals, in addition to 11 maintained on a normal, adequate diet, received alternate-day applications of standardized volume, exposure time and duration (maximum of 80 days). Another group of 14 mice served as controls in order to rule out any significant influence of pressure and suction alone incident to the use of the smoking machine.

Gross and microscopic findings in the experimental groups showed that riboflavin and pyridoxine deficiencies are those fractions of the B complex most responsible for tissue susceptibility (characterized by hyperkeratinization, hyperplasia, acanthosis, dyskeratosis, inflammation and fibrosis). Appreciably less severe changes were noted in the pantothenic acid and thiamine-depleted animals; practically no changes were noted in the niacin and biotin groups. That gonadectomy also influences tissue susceptibility to whole tobacco smoke was demonstrated by the lessened reaction of riboflavin deficient mice after castration.

ELECTRON MICROSCOPY OF HUMAN DENTIN

Gonpachiro Yasumi and Yoshimi Obata, p. 808.

Metal-shadowed methyl methacrylate-aluminum replicas demonstrated that the sheath of Tomes's fibers was composed of a nonfibrous membrane and that Neumann's sheath was enclosed with collagenous fibers. Noncalcified, collagenous fibers were found in the matrix of mature dentin and in the dental tubule.

MEASUREMENT OF THE ELECTRIC CONDUCTIVITY OF DENTAL CEMENT. IV. EXTRACTED HUMAN TEETH; IN VIVO TESTS; SUMMARY

Lloyd J. Phillips, Ralph W. Phillips and Richard J. Schnell, p. 839.

Basic values for the electric conductivity of dental cementing materials have been determined in previous studies. Data reported in this paper indicate that under *in vivo* conditions, moisture, either by penetrating through the material or around the margins, prevents insulation of the metallic restoration from the tooth. Cement bases contribute little or nothing to this insulation. It is important that the results of this work be interpreted only with respect to electric conduction.

A SIMPLE METHOD OF INCREASING THE ADHESION OF ACRYLIC FILLING MATERIALS TO ENAMEL SURFACES

Michael G. Buonocore, p. 849.

The adhesion of acrylic resin filling materials to intact enamel surfaces intraorally can be increased by chemical treatment of the surfaces prior to application of the resin. Two types of treatment were used: (1) Phosphomolybdic acid reagent in conjunction with oxalic acid, (2) 85 per cent phosphoric acid solution. Duration of adhesion provided the basis for determining the effects of surface treatments. Treatment one gave an average adhesion time of 160 hours against six hours for untreated surfaces. Treatment two gave 1,070 hours against 11 hours for untreated surfaces.

EFFECTS OF FILLING MATERIALS ON THE PULP OF THE RAT INCISOR

Maria Silberkweit, Maury Massler, Isaac Schour and Joseph P. Weinmann, p. 854.

Cavities were prepared in the incisors of 74 albino rats and filled with a variety of filling materials to determine the effects of filling materials on the young pulp and the odontoblasts. The effects were reflected in alterations in the calcification and formation of the postoperative dentin. Alterations in dentin calcification and formation are delicate indicators

of the altered physiology and function of the odontoblasts.

Animals were sacrificed two and seven or eight days after the operation. It was found that the use of zinc-oxide-eugenol produced minimal alterations in the calcification of the developing dentin and no observable morphologic changes in the pulp or odontoblasts, whereas silicate and copper cements produced reduction, marked arrest in dentin formation and calcification and death of odontoblasts.

The order of effects increased from zinc-oxide-eugenol to amalgam, self-curing acrylic resins, zinc oxyphosphate cements, silicates and copper cements. Cavity varnish was found to be ineffective in protecting the pulp against injury by silicates. Calcium compound liners were found to be effective in this respect.

The validity of using the incisor of the albino rat to test the biologic response of the pulp to different filling materials was demonstrated in this study.

DENTAL CARIES IN CHILDREN ONE TO SIX YEARS OF AGE AS RELATED TO SOCIOECONOMIC LEVEL, FOOD HABITS AND TOOTHBRUSHING

Bhim Sen Savara and Theodore Suher, p. 870.

Association of incidence of dental caries with the socioeconomic status of parents was investigated in 279 children. The mother of the child was interviewed at home by trained interviewers to determine the socioeconomic status and obtain information on the food and oral hygiene habits of the children. A negative association was found between the parent's (father's as well as mother's) education and dental caries (def teeth). Parents' education was found to be associated with the number of times per day the children brushed their teeth. Parents' income was not found to be associated with the incidence of dental caries, food or oral hygiene habits in these 279 children.

THE EFFECTS OF CASTRATION, SEX HORMONES AND DESALIVATION ON DENTAL CARIES IN THE RAT

David Bixler, Joseph C. Muhler and William G. Shafer, p. 889.

Orchiectomy in 30 day old rats resulted in a significant reduction in dental caries, while ovariectomy at this age produced only a tendency toward reduction. Castration at 60 days of age had no significant effect on dental caries in either sex. In the animals which were both castrated and desalivated, gonadectomy was still effective in reducing the incidence of dental decay. Hormone injections into these animals resulted in a dental caries score of approximately the same magnitude as that found in the animals which were desalivated.

Castration resulted in an increased adrenal weight in the male and a decreased adrenal weight in the female; desalivation had no significant effect. Desalivation resulted in a significant decrease in testis weight; the effect on the weight of the uterus was of doubtful significance.

FLUORINE STORAGE IN RATS RECEIVING DIFFERENT FLUORIDES IN THE DRINKING WATER AT VARYING pH

Joseph C. Muhler and Donovan A. Weddle, with the technical assistance of James O. Stewart, p. 895.

The pH of fluoridated drinking water determines to a major degree the effectiveness of stannous fluoride or stannous chlorofluoride in reducing the incidence of dental caries in the rat. As the pH is increased from 2 to 4, the effectiveness is decreased by approximately 50 per cent. Stannous chlorofluoride appears superior to both stannous fluoride and sodium fluoride, even at higher pH values.

When identical amounts of fluorine were given, similar amounts of fluorine were stored in the femurs. In rats given fluorine by means of a stomach tube, only half the ingested fluoride was stored in the carcass. Stannous fluoride and sodium monofluorophosphate appeared to cause the storage of less fluorine than stannous chlorofluoride or sodium fluoride, when the compounds were given by a stomach tube in aqueous solution.

METABOLISM OF SMALL CONCENTRATIONS OF FLUORINE IN THE ALBINO RAT

Donovan A. Weddle and Joseph C. Muhler, p. 900.

A method has been devised for the study of the metabolism of fluorine in the rat which allows the individual rat to be used throughout the experiment, thus eliminating, or at least reducing, the problem of biologic variance which is so frequently encountered even when littermates are compared. Using this method, it has been observed that the rate of retention of fluorine is apparently affected only during the first few days after the administration of fairly large doses of the element. However, the effect is not noticeable when the animal is maintained on a moderate

concentration of fluorine for a relatively long period of time thereafter.

EFFECT OF DESALIVATION ON ADRENALS, UTERUS AND TESTES IN THE RAT

David Bixler, Joseph C. Muhler and William G. Shafer, p. 910.

The adrenal glands of desalivated male rats showed a widening of the zona glomerulosa. The change appeared to be due principally to the presence in this layer of large lipoid-filled cells resembling those in the zona fasciculata. The female desalivated rats showed similar but less pronounced changes. Under *ad libitum* feeding conditions, desalivation resulted in adrenal weight changes in the females which did not occur in a pair-feeding experiment. The testes were not significantly altered under pair-feeding conditions, although the uteri of desalivated animals significantly increased in size in both experiments.

CHARACTERISTICS OF A PROTEOLYTIC ENZYME IN THE SUBMAXILLARY AND SUBLINGUAL GLANDS OF THE ALBINO RAT

Leo M. Sreebny, Julia Meyer and Erica Bachem, p. 915.

Saline or buffer extracts of frozen-dried rat submaxillary glands demonstrated protease activity against casein and Azocol. Similar extracts from rat spleen, liver, pancreas, testis, kidney, muscle, parotid and sublingual glands did not liberate color from Azocol.

This report deals with the alkaline protease of the submaxillary glands. Quantitative estimations of enzyme activity were made from (1) the optical density of Azocol-enzyme preparations at 522 microns and (2) the tyrosine liberated from casein-enzyme preparations (Folin-Ciocalteu reagent).

The enzyme was active toward Azocol, casein, gelatin and benzoyl-arginine amide; inactive toward gastric mucin, chondroitin sulfate and native collagen.

The pH optimum for Azocol was 8.5 to 9.6, with activity dropping rapidly on either side of the optimum. For casein, the optimum pH was 9.6; activity dropped off slowly from pH 7 to 5, then rapidly from pH 5 to 3.

The alkaline protease is relatively thermostable; optimum temperature—50 to 55 degrees C. It is not destroyed by heating at 75 degrees C. for 14 minutes but is completely destroyed by similar treatment at 100 degrees C.

In the reaction with casein, at pH 9.6, the enzyme was activated by cysteine and ascorbic acid and inhibited by iodine; iodoacetic acid and magnesium sulfate had no effect.

Against Azocol, trypsin inhibitor and magnesium sulfate had no effect. Dialysis of the enzyme extract resulted in a decrease in enzyme activity because of the loss of some inorganic component. The action of the enzyme system follows the monomolecular reaction curve. The limiting substrate concentration is at about 1.0 per cent casein; the limiting velocity is 0.48 mg. of tryosine liberation, and the Michaelis constant is 0.086 per cent casein.

THE RATE OF ENDOGENOUS OXYGEN CONSUMPTION IN BOVINE DENTAL PULP

Donald E. Flieder and Alton K. Fisher, p. 921.

The dental pulps of freshly killed cattle were sliced and placed in small Warburg flasks containing Krebs-Ringers phosphate solution. The oxygen uptake was found to be 0.56 (standard deviation ± 0.13) microliters per mg. dry weight of pulp tissue per hour.

PRODUCTION OF HYALURONIDASE AND BETA-GLUCURONIDASE BY VIRIDANS STREPTOCOCCI ISOLATED FROM GINGIVAL CREVICES

Stig D. Schultz-Haudt and Henry W. Scherp, p. 924.

Strains of *Streptococcus mitis* and *Streptococcus salivarius* isolated from the gingival crevices of 31 adults, selected only for the presence or absence of clinically manifest marginal gingivitis, were tested for the production of hyaluronidase and beta-glucuronidase. Previous study leads to the belief that these enzymes contribute to the development of marginal gingivitis.

Both the proportion of subjects yielding one or more positive strains and the over-all proportion of strains producing these enzymes were significantly higher in the group having gingivitis. The hyaluronidase was extracellular, whereas the beta-glucuronidase was endocellular. Neither enzyme was formed adaptively, and positive mutants did not arise spontaneously from negative strains. These observations indicate the participation in gingivitis of a more specific group of bacteria than has been generally recognized.

Deaths

Alpert, Gilbert E., Park Forest, Ill.; University of Illinois, College of Dentistry, 1949; died April 22; aged 33.

Annucci, A. William, New York; College of Dental and Oral Surgery, New York, 1923; died April 19; aged 59.

Badgley, George W., Excelsior, Minn.; died February 14; aged 68.

Beher, Carl F., Rushville, Ind.; Ohio College of Dental Surgery, University of Cincinnati, 1901; died April 21; aged 76.

Besse, Harlan F., Concord, N. H.; Tufts University, School of Dental Medicine, 1917; died April 8; aged 61.

Bleak, Rex H., West Palm Beach, Fla.; University of Southern California, College of Dentistry, 1949; died April 1; aged 37.

Blumberg, Jacob J., Montclair, N. J.; New York College of Dentistry, 1922; died April 14; aged 57.

Bomelstein, Harry, New York; New York College of Dentistry, 1917; died February 14; aged 59.

Bower, Leon L., Philadelphia; Temple University, School of Dentistry, 1914; died March 31; aged 85.

Branigan, Edward B., Groton, Mass.; Tufts University, School of Dental Medicine, 1908; died April 23; aged 73.

Brown, Evan A., Santa Monica, Calif.; Northwestern University Dental School, 1907; died May 15; aged 70.

Bucknam, Earle S., Boston; Tufts University, School of Dental Medicine, 1918; died April 20; aged 60.

Campbell, Elmer H., Benton, Ill.; St. Louis University, School of Dentistry, 1921; died April 13; aged 66.

Carrigan, James S., Colorado Springs, Colo.; St. Louis University, School of Dentistry, 1940; died February 20; aged 43.

Chamblee, Frank G., Spring Hope, N. C.; University College of Medicine, Dental Department, Richmond, 1905; died April 9; aged 75.

Claytor, William O., Washington, D. C.; Howard University, College of Dentistry, 1916; died April 11; aged 76.

Clements, Ralph D., Raleigh, N. C.; Harvard University Dental School, 1927; died February 7; aged 58.

Conn, Frank A., Hartley, Iowa; College of Dentistry, University of Iowa, 1897; died February 4, 1955; aged 82.

Costley, Claude A., Mondovi, Wis.; Chicago College of Dental Surgery, Loyola University, 1897; died December 15, 1955; aged 81.

Curry, Charles F., Pacific Grove, Calif.; Denver College of Dentistry, 1911; died February 23; aged 67.

Daly, George R., Yonkers, N. Y.; New York College of Dentistry, 1905; died February 1; aged 73.

Dickey, Harley J., Cadiz, Ohio; Ohio State University, College of Dentistry, 1917; died April 14; aged 61.

Dimin, Morris B., Flushing, N. Y.; New York University, College of Dentistry, 1907; died April 11; aged 72.

Dingwell, Andrew, Clinton, Iowa; College of Dentistry, State University of Iowa, 1890; died March 26, 1955; aged 88.

Dworetzky, Jacob, Brooklyn; New York College of Dentistry, 1925; died March 18; aged 57.

Ewen, Stanley G., Estherville, Iowa; University of Iowa, College of Dentistry, 1917; died July 1, 1955; aged 65.

Fenelon, James J., Swampscott, Mass.; Tufts University, School of Dental Medicine, 1904; died April 24; aged 75.

Fisher, Jonas, Brooklyn; New York College of Dentistry, 1912; died February 17; aged 65.

Flora, Edward H., Portland, Ore.; North Pacific College of Oregon, School of Dentistry, Portland, 1925; died April 30; aged 55.

Goelz, Elmore W., Plainfield, Wis.; Marquette University Dental School, 1917; died April 22; aged 61.

Goodman, George O., Sr., Canton, S. D.; Northwestern University Dental School, 1902; died March 6; aged 76.

Griess, Gustav M., Fowler, Colo.; Lincoln Dental College of Cotner University, 1912; died February 14; aged 68.

Griffith, Harry Park, Indiana, Pa.; Philadelphia Dental College, 1885; died April 6; aged 95.

Grogan, Eugene D., Burlington, Iowa; College of Dentistry, University of Iowa, 1930; died April 3, 1955; aged 49.

Hamilton, C. Bernard, Fort Dodge, Iowa; University of Iowa, College of Dentistry, 1934; died April 17; aged 47.

Haskin, James P., Gallipolis, Ohio; Ohio Medical University, College of Dentistry, 1905; died April 8; aged 79.

Henderson, Fred W., Omaha, Neb.; University of Nebraska, College of Dentistry, 1926; died April 10; aged 60.

Hayes, James K., New Brunswick, N. J.; died April 11; aged 53.

Hornung, Ralph S., San Francisco; University of California, College of Dentistry, 1926; died May 7; aged 53.

Hoyne, Kenneth B., Centerville, S. D.; University of Iowa, College of Dentistry, 1918; died May 13, 1955; aged 61.

Jacobs, David B., Far Rockaway, N. Y.; University of Buffalo, School of Dentistry, 1918; died March 22; aged 60.

Kaswiner, Sigmund, Newark, N. J.; New York College of Dentistry, 1918; died April 23; aged 60.

Kauffelt, Thaddeus D., Huntington, W. Va.; Baltimore College of Dental Surgery, University of Maryland, 1919; died April 13; aged 59.

Keyes, John A., Chicago; Northwestern University Dental School, 1907; died November 18, 1955; aged 72.

Kirtlan, Edward E., Pasadena, Calif.; Vanderbilt University, School of Dentistry, 1899; died March 11; aged 83.

Lane, Francis Burleson, Jackson, Tenn.; Meharry Medical College, Dental Department, 1927; died February 18; aged 56.

Latta, Robert E., Atlanta, Ga.; Atlanta Dental College, 1917; died April 8; aged 61.

Levitch, Irving L., New York; New York College of Dentistry, 1921; died March 28; aged 57.

Lewis, Luther D., Great Bend, Kan.; Virginia School of Dentistry, Medical College of Virginia, Richmond, 1907; died April 23; aged 75.

Lindsay, Edgar W., Chester, Pa.; University of Pennsylvania, School of Dentistry, 1917; died March 1956; aged 64.

Lockwood, Walter B., Charles City, Iowa; Chicago College of Dental Surgery, Loyola University, 1897; died April 14, 1955; aged 84.

Logan, Emerson E., Weiser, Idaho; North Pacific College of Oregon, School of Dentistry, Portland, 1925; died April 17; aged 59.

Lynch, Cornelius J., Great Falls, Mont.; University of Minnesota, College of Dentistry, 1925; died March 22; aged 58.

MacRury, Colin H., Manchester, N. H.; died May 13; aged 83.

Malony, John H., Corydon, Iowa; Northwestern University Dental School, 1902; died April 4, 1955; aged 74.

Markle, Grant E., Des Moines, Iowa; College of Dentistry, Drake University, 1912; died May 22, 1955; aged 73.

Martin, Frank F., Easton, Pa.; Temple University, School of Dentistry, 1928; died May 13; aged 61.

Maxwell, Robert G., Albion, Neb.; Lincoln Dental College of Cotner University, 1908; died February 28; aged 69.

McAyeal, Clarence R., Portland, Ore.; Philadelphia Dental College, 1902; died April 14; aged 78.

McBride, David J., Linden, N. J.; Pennsylvania College of Dental Surgery, 1906; died April 14; aged 76.

McClellan, Hugh E., Bristol, Tenn.; Atlanta-Southern Dental College; 1921; died March 31; aged 61.

McCrudden, James E., Huntington Station, N. Y.; Harvard University Dental School, 1939; died February 7; aged 43.

McGill, Waldo K., Jr., Williston, S. C.; Emory University, School of Dentistry, 1950; died April 21; aged 34.

McMillen, Samuel S., Los Angeles; Western Dental College, 1900; died April 24; aged 78.

McNeil, Lillard C., Winter Haven, Fla.; University of Louisville, School of Dentistry, 1931; died February 18; aged 50.

Metcalf, John C., San Marino, Calif.; Kansas City-Western Dental College, 1916; died April 12; aged 64.

Miller, Watson T., Crawfordsville, Ind.; Central College of Dentistry, Indianapolis, 1900; died April 1956; aged 78.

Milne, Floyd G., Portland, Ore.; North Pacific College of Oregon, School of Dentistry, Portland, 1926; died May 3; aged 52.

Mobley, Charles W., Columbus, Ohio; Ohio State University, College of Dentistry, 1926; died March 31; aged 59.

Morison, William P., Onalaska, Wash.; Northwestern University Dental School, 1918; died April 18; aged 68.

Morris, J. Harold, Poughkeepsie, N. Y.; University of Pennsylvania, School of Dentistry, 1919; died April 13; aged 58.

Moulin, Edward J., Lawrence, Mass.; Tufts University, School of Dental Medicine, 1923; died April 11; aged 59.

Mulrey, Beatrice E., Cambridge, Mass.; Tufts University, School of Dental Medicine, 1912; died April 21; aged 67.

Murphy, John J., Jr., Washington, D. C.; Georgetown University, School of Dentistry, 1954; died April 14; aged 35.

Murray, Robert J., Hartford, Conn.; Baltimore College of Dental Surgery, 1910; died March 23; aged 74.

Nesbitt, Kenneth I., San Francisco; University of California, College of Dentistry, 1924; died April 17; aged 52.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N.J.
Ninety-Eighth Annual Session	Nov. 4-7, 1957	Miami, Fla.
Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York
One-Hundred and First Annual Session	Oct. 17-20, 1960	Los Angeles

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 16-18, 1957	Birmingham	F. A. Finney, Jr.	Box 787, Gadsden
Alaska			J. L. Irby	1010 Noble St., Fairbanks
Arizona	May 1-4, 1957	Chandler	W. G. Burke	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 7-10, 1957	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 15-17, 1957	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 7-10, 1957	Los Angeles	S. M. Silverman	903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 21-24	Colorado Springs	W. R. Humphrey	Republic Bldg., Denver
Connecticut	May 15-17, 1957	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 1957		J. C. Gantt	1102 N. Jackson, Wilmington
District of Columbia	Mar. 10-13, 1957	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	Apr. 15-17, 1957	St. Petersburg	W. C. Mayo	Brent Annex, Pensacola
Georgia	Oct. 21-24	Savannah	J. W. Yarbrough	Southern United Bldg., Macon
Hawaii			J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho			D. E. Sonius	125 Fourth Ave., N., Twin Falls
Illinois	May 12-15, 1957	Peoria	P. W. Clopper	Jefferson Bldg., Peoria
Indiana	May 20-22, 1957	Indianapolis	W. R. Shoemaker	Citizens Bank Bldg., Anderson
Iowa	May 5-8, 1957	Des Moines	H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas	May 13-16, 1957	Wichita	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	Mar. 31-Apr. 3, 1957	Louisville	A. B. Coxwell, Jr.	1976 Douglass Blvd., Louisville
Louisiana	Apr. 24-27, 1957	Lake Charles	J. S. Bernhard	2515 Line Ave., Shreveport
Maine			S. M. Gower	Box 27, Skowhegan
Maryland	May 5-8, 1957	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 5-8, 1957	Boston	H. E. Tingley	12 Bay State Rd., Boston 15
Michigan	Apr. 8-10 1957	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 1-3, 1957	Minneapolis	C. V. E. Cassel	Hamm Bldg., St. Paul
Mississippi	Apr. 28-May 1, 1957	Jackson	B. A. Cohen	Plaza Bldg., Jackson 27
Missouri	May 26-29, 1957	St. Louis	E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana			E. G. Vedova	Box 311, Roundup
Nebraska	Apr. 29-May 1, 1957	Lincoln	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	May 5-7, 1957	Las Vegas	O. M. Seifert	755 Ryland Ave., Reno
New Hampshire	June 16-19, 1957	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	May 12-15, 1957	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 19-22, 1957	Albuquerque	J. S. Eilar	7 Medical Arts Sq., N.E., Albuquerque
New York	May 20-22, 1957	New York	C. A. Wilkie	1 Hanson Pl., Brooklyn
North Carolina	May 5-8, 1957	Pinehurst	L. H. Butler	Jefferson Bldg., Greensboro
North Dakota	Apr. 28-May 1, 1957	Fargo	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio	Oct. 28-31	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 14-17, 1957	Tulsa	S. A. Russman	1219 Classen Dr., Oklahoma City
Oregon	Mar. 4-6, 1957	Portland	T. D. Holder	Selling Bldg., Portland

State	Date	Place	Secretary	Address
Panama Canal Zone	Apr. 4-5, 1957	Albrook A.F.B.	A. L. Robertson	5700 USAF Dispensary, Albrook Air Force Base
Pennsylvania	May 23-25, 1957	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Nov. 25	San Juan	R. Carrasquillo	P. O. Box 214, De Diego #3 Rio Piedras
Rhode Island	Jan. 22, 23, 1957	Providence	J. S. Allen	Union Trust Bldg., Providence
South Carolina	May 12-14, 1957	Myrtle Beach	J. E. Wallace	1420 Gregg St., Columbia
South Dakota	May 12-14, 1957	Watertown	R. E. Decker	Box 308, Parker
Tennessee	May 13-16, 1957	Gatlinburg	A. M. Ballentine	215 W. Flower St., Pulaski
Texas	Apr. 28-May 1, 1957	Houston	W. Ogle	3707 Gaston Ave., Dallas 10
Utah	May 23-25, 1957	Salt Lake City	R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont	May 26-28, 1957	Manchester	E. H. Van Santvoord	22 Washington St., Rutland
Virginia	Apr. 29-May 1, 1957	Virginia Beach	W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	Apr. 1-3, 1957	Seattle	J. M. Deines	Medical & Dental Bldg., Seattle
West Virginia	July 21-24, 1957	White Sulphur Springs	G. N. Casto, Jr.	3820 McCorkle Ave., S.E. Charleston
Wisconsin	Apr. 29-May 1, 1957	Milwaukee	H. O. Hoppe	1331 W. Vliet St., Milwaukee
Wyoming	June 1957	Sheridan	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama			W. L. McCarty	Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas			W. T. Jones	107 E. Shelton, Monticello
California	Jan. 28-Feb. 2, 1957	San Francisco	T. G. Atwood	450 Sutter St., San Francisco
	June 24, 1957	Los Angeles		
	July 29, 1957	San Francisco		
Colorado			R. F. Gilmore	Republic Bldg., Denver
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	1835 Eye St., N.W., Washington
Florida	July 8-18, 1957*†	Jacksonville	R. P. Taylor, Jr.	P. O. Box 2913, Jacksonville 3
Georgia			P. M. McNeil	First National Bank Bldg., Rome
Hawaii			H. L. Houvener	Dillingham Bldg., Honolulu
Idaho	June 24-26, 1957	Boise	A. G. DeWinter	Sun Bldg., Boise
Illinois	Nov. 27-30‡		W. A. McKee	Wood Bldg., Benton
Indiana	Nov. 5-8*†	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	May 27-31, 1957*†	Iowa City	P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			J. J. Kelly	102 W. Madison St., Franklin
Louisiana			R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby	Box 260, Skowhegan
Maryland	Nov. 12-14‡ June 10-12, 1957‡		H. Levin	3429 Park Heights Ave., Baltimore 15
Massachusetts			T. J. Glennon	323 Main St., Woburn
Michigan	Jan. 13-19, 1957	Detroit	J. L. Champagne	3714 W. McNichols Rd., Detroit 21
	June 9-15, 1957	Ann Arbor		
Minnesota	Jan. 7-11, June 17-21, 1957*†	Minneapolis	M. G. Walls	Lowry Bldg., St. Paul
Mississippi	Jan. 3-5, June 18-20, 1957*†	Jackson	J. C. Boswell	Medical Arts Bldg., Jackson

State	Date	Place	Secretary	Address
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			R. O. Betzner	303 Power Block, Helena
Nebraska			H. E. Weber	Federal Securities Bldg., Lincoln
Nevada			R. Whitehead	Masonic Temple, Reno
New Hampshire			S. G. Markos	8 Renaud Ave., Dover
New Jersey			W. A. Wilson	150 E. State St., Trenton
New Mexico			J. J. Clarke, Sr.	Artesia
New York	Oct. 10, 11, 16-19*‡ Oct. 10, 16, 17†‡		D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota			T. M. Flath	Williston
Ohio	Oct. 22-27	Columbus	H. B. Smith	322 E. State St., Columbus 15
Oklahoma			W. E. Cole	2420 N. Meridian, Oklahoma City
Oregon	Dec. 3-5*†	Portland	F. L. Utter	Pioneer Trust Bldg., Salem
Pennsylvania			A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			J. L. Gunter	1226 Pickens St., Columbia 1
South Dakota			H. T. Aker	Canton
Tennessee	Dec. 10-14‡		C. R. Aita	Bennie-Dillon Bldg., Nashville
Texas			R. T. Weber	Capital National Bank Bldg., Austin 16
Utah	June 24-30, 1957‡		A. Ridge, Jr.	10 S. Second E., Provo
Vermont			P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington	Jan. 14-17, 1957	Seattle	R. W. Frick	P. O. Box 308, Pomeroy
West Virginia	June 24-26, 1957	West Liberty	C. C. Cottrill	Box 111, Glen Rogers
Wisconsin			S. F. Donovan	Tomah
Wyoming			W. A. Hocker	O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
American Academy of Maxillofacial Prosthetics	Jan. 31-Feb. 2, 1957	Chicago	A. H. Bulbulian Pres.	Mayo Clinic, Rochester, Minn.
American Association for the Advancement of Science, Section on Dentistry	Dec. 28, 29	New York	R. W. Bunting Secy.	Society of Dentistry, University of Michigan, Ann Arbor, Mich.
American Dental Assistants Association	Oct. 1-4	Atlantic City, N.J.	M. L. Martin Exec. Secy.	410 First National Bank Bldg., La Porte, Ind.
American Dental Hygienists' Association	Oct. 1-4	Atlantic City, N.J.	M. E. Swanson Exec. Secy.	1735 Eye St., N.W., Washington 6, D.C.
American Institute of Dental Medicine	Nov. 4-8	Palm Springs, Calif.	M. Lewis Exec. Secy.	2240 Channing Way, Berkeley 4, Calif.
American Public Health Association, Inc.	Nov. 12-16	Atlantic City, N.J.	R. M. Atwater Exec. Secy.	1790 Broadway, New York
Association of American Women Dentists	Oct. 1	Atlantic City, N.J.	N. E. McDonald Secy.	151 Engle St., Englewood, N.J.
Bermuda Dental Association, Mid-Atlantic Dental Conference	Oct. 7-10	Hamilton, Bermuda	W. C. Price	Bermuda Dental Association, Hamilton, Bermuda
Chicago Dental Society	Feb. 3-6, 1957	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Cincinnati Dental Society	Mar. 17-19, 1957	Cincinnati	H. G. Frankel Chm.	Doctors Bldg., Cincinnati
Council on Dental Education, Dental Aptitude Tests	Oct. 5, 6		S. Peterson Secy.	222 E. Superior St., Chicago
Denver Dental Association	Jan. 6-9, 1957	Denver	E. T. Klein Secy.	Republic Bldg., Denver
Detroit District Dental Society, Fifteenth Annual Dental Review	Nov. 26, 27	Detroit	A. H. Grob Pub. Chm.	11751 Grand River, Detroit 4

Name	Date	Place	Secy. or Chm.	Address
Greater New York Dental Meeting	Dec. 3-7	New York	R. E. Morse Gen. Chm.	Hotel Statler, New York 1
Greater Philadelphia Annual Meeting	Mar. 27-29, 1957	Philadelphia	H. Silver Exec. Secy.	Bellevue-Stratford Hotel, Broad and Walnut Sts. Philadelphia 2
International Association for Dental Research	Mar. 21-24, 1957	Atlantic City, N.J.	D. Y. Burrill Asst. Secy.	129 E. Broadway, Louisville 2, Ky.
International Dental Congress	June 1-9, 1957	Turin, Italy	B. Roccia Dir.	Dentistry Clinic, University of Turin, Corso Polonia 2, Italy
Mid-Continent Dental Congress and Centennial Meeting of the St. Louis Dental Society	Nov. 25-28	St. Louis	J. E. Brophy Exec. Secy.	8013 Maryland Ave., St. Louis 5
National Board of Dental Examiners	Dec. 3,		G. J. Casey Secy.	222 E. Superior St., Chicago
New England Dental Society	Oct. 24, 25	Boston	F. L. Finley, Jr. Secy.	43 Farmington Ave., Hartford, Conn.
New Orleans Dental Conference	Nov. 11-14	New Orleans	B. G. Frick, Jr. Secy.	Maison Blanche Bldg., New Orleans 16
Ninth District Dental Society of Montana	Jan. 17-19, 1957	Billings, Mont.	C. H. Betzer Secy.	1125 Poly Dr., Billings, Mont.
Northeastern Society of Orthodontists	Oct. 29, 30	Hartford, Conn.	W. J. Prezzano Secy.	Medical Centre, White Plains, N.Y.
Southwestern Society of Orthodontists	Oct. 7-10	Houston, Texas	H. S. Born Secy.	908 S. Johnstone Ave., Bartlesville, Okla.
Thirtieth Journees Dentaires Internationales de Paris	Nov. 26-Dec. 2	Paris, France	P. Coustaing Secy. Gen.	50, rue Pierre Charron, Paris, France

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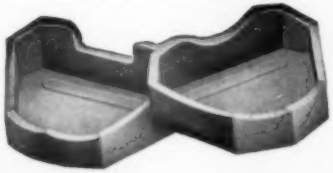

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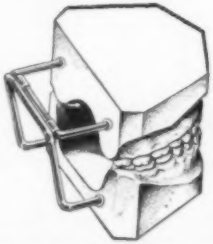

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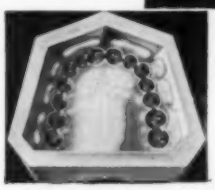

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References: **1.** Glasser, M. M., New York J. Dentistry 25:229, June-July 1955. **2.** Council on Rheumatic Fever and Congenital Heart Disease, American Heart Association, Circulation 11:317, Feb. 1955. **3.** Grimm, D. H. and Albertson, G. L., J. Calif. State Dental Assoc. and Nevada State Dental Soc. 30:300, Sept.-Oct. 1954. **4.** Glickman, I., Clinical Periodontology, Philadelphia, W. B. Saunders Co., 1953, p. 839. **5.** Goldman, H. M., Periodontia, 3rd ed., St. Louis, C. V. Mosby Co., 1953, p. 701. **6.** Beube, F. E.; Periodontology, New York, Macmillan Co., 1953, p. 417. **7.** Ostrander, F. D., J.A.D.A. 46:139, Feb. 1953. **8.** Council on Dental Therapeutics, J.A.D.A. 45:212, Aug. 1952. **9.** Dobbs, E. C. and Eskow, A. B., New York J. Dentistry 21:458, Dec. 1951. **10.** Keefer, C. S., Postgrad. Med. 9:101, Feb. 1951. **11.** Thoma, K. H., Oral and Dental Diagnosis, 3rd ed., Philadelphia, W. B. Saunders Co., 1949, p. 357. **12.** Ziskin, D. E., Kutscher, A. H. and Clark, A. R., J.A.D.A. 35:627, Nov. 1947. **13.** Woofter, A. C. and Hoffman, O. E., J. Iowa M. Soc. 35:189, May 1945.

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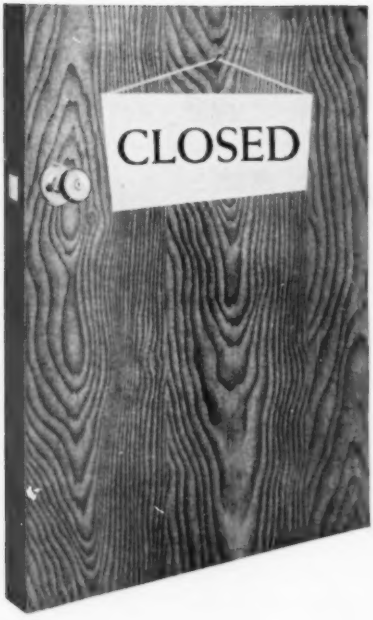

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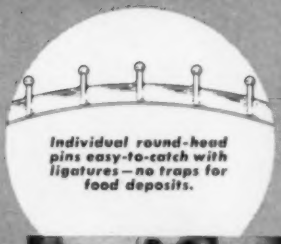

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1. Maynard, L.A., and Nelson, W.L., in Handbook of Nutrition, American Medical Association, ed. 2, Philadelphia, The Blakiston Company, 1951, p. 625.
2. Aughey, E., and Daniel, E.P., cited by Maynard, L.A., and Nelson, W.L.: Foods of Plant Origin, ibid.

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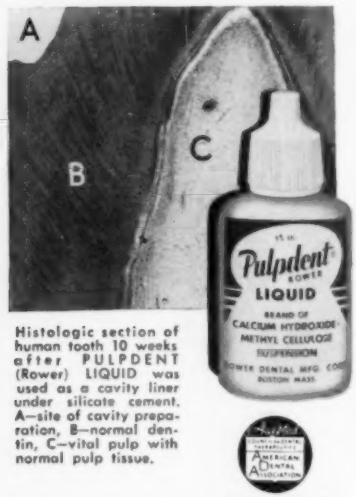

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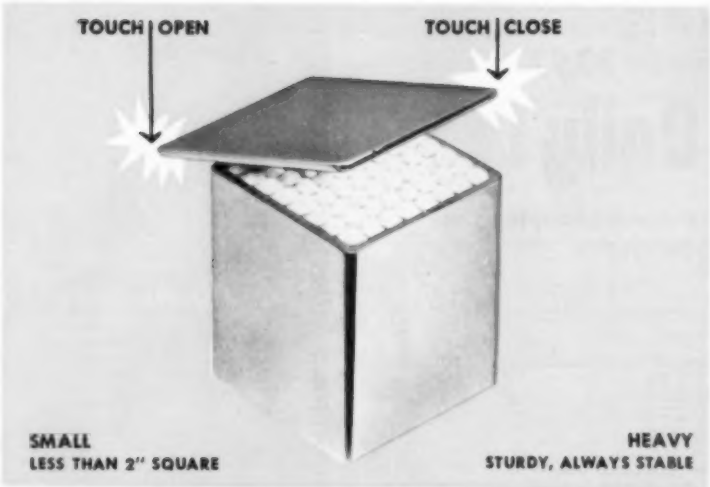

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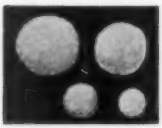

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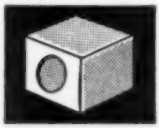

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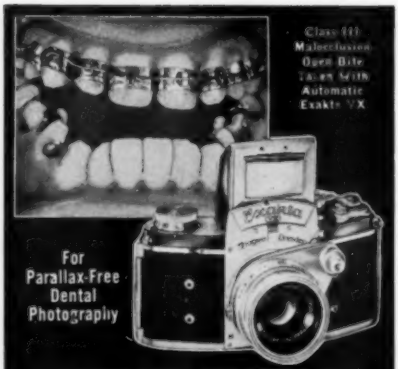

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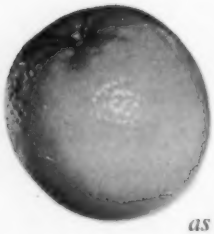

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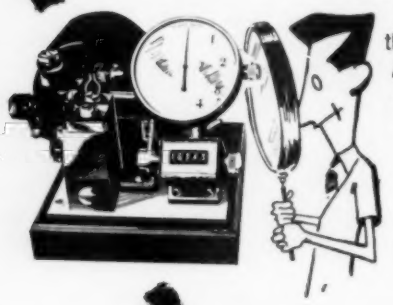

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CALIFORNIA—For sale. Well established general practice in rapidly growing foothill town, 15 miles east of Pasadena. Two completely equipped operating rooms, laboratory, reception room, business office. Address A.D.A. Box No. 432.

•

FLORIDA—For sale. Because of sudden illness; well established orthodontic practice. Fully equipped, modern two-chair office. Set up for volume practice. Located in greater Miami area. Address A.D.A. Box No. 440.

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FLORIDA—For sale. Active practice. Fully equipped, bungalow office building with parking lot. Price $40,000. Terms. $10,000 down. Inquiries invited. Dr. George J. Parker, Box 565, Tarpon Springs, Fla.

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FLORIDA—For sale. Completely equipped and air-conditioned two operating room office in city of 12,000 in central part of state. Young practice, but patients scheduled one month in advance. Owner going in service. Price $8,000. Dr. E. Clement Allen, 156 N. Central Ave., Bartow, Fla.

•

ILLINOIS—For sale. Unusual opportunity to take over high volume practice in air-conditioned office. Room for three chairs. No competition in entire county. With or without equipment. Leaving state. Dr. A. E. Marshall, Albion.

ILLINOIS—For sale. New modern bungalow dental office building and practice in central Illinois town of 13,000. It is a two-chair standard office, well located, air-conditioned, sound conditioned, well landscaped, on large lot, near business center, with ample parking. The practice is active, cash, with good gross. Address A.D.A. Box No. 429.

•

ILLINOIS—For sale. Four year part-time practice in central Illinois town of 1,900. Larger cities 60 and 20 miles. One dentist in residence. Ritter B 1500 RPM, E & O light, some instruments, cabinet, diamond chair, laboratory, air conditioner and Kleen-Air compressor. Address A.D.A. Box No. 396.

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INDIANA—For sale. Attractive one-chair unit office with home combination in small northern Indiana city. Space for two more units if desired. Ideally located, Main St., ground floor. Good hunting and fishing area. Excellent for a young dentist starting full practice or an older dentist wishing to relax in a smaller community. Appointment book is filled, large recall list available. Dentist will stay and introduce. Convenient terms. Will carry contract. Address A.D.A. Box No. 430.

•

KANSAS—For sale. Going to orthodontic school. Two chair, well equipped, four year old office with two x-rays. Located in four year old air-conditioned medical clinic. Lease available with right to buy area. Two well trained assistants willing to stay. Pay for equipment over three years. Grossing $35,000. Address A.D.A. Box No. 419.

•

KENTUCKY—Office space for reasonable rent. Ideal location for dentist. No competition. Three miles south of Paducah, on U.S. 45, in community of Lone Oak, with population of 2,000. Will draw 50 per cent of practice from Paducah. No parking difficulty. For information call or write J. F. Hicks, D.C., 3307 Lone Oak Road, Paducah, Ky.

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MARYLAND—For sale. Practice grossing beyond $30,000 with one month off in small community, only dentist. Priced for the value of the excellent equipment, attractive terms. Two operating rooms, two x-ray machines, etc. Good inlay and bridge practice. Specializing. Address A.D.A. Box No. 438.

MASSACHUSETTS—Renting dental suite. Generous terms. First floor bank, second floor legal and medical offices. No competition. Parking. Maximum medical cooperation. Excellent income. Unusual opportunity and ideal location. Dr. Alifano, 924 Main St., Springfield 3, Mass.

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MICHIGAN—For sale. Northwestern section, lower peninsula. Attractive brick and stone, modern one story dental building. Room for combined offices or living quarters. Excellent opportunity, terms. Address A.D.A. Box No. 437.

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MICHIGAN—For sale. Successful, select, 30 year practice and attractive lake shore colonial home with connecting two-chair, ground floor, Ritter equipped office. Beautiful grounds, ideally located in prosperous county seat of upper peninsula. Unlimited opportunities, only four dentists in county of 27,000. Fine fishing, sailing, hunting. Hygienist available. Owner retiring. Will introduce. Very attractive price, low down payment, liberal terms. Address A.D.A. Box No. 446.

•

MISSOURI—Bethany. For sale. Complete dental office, Ritter unit, x-ray and instruments and supplies. County seat town, good opportunity. Selling because of recent death of dentist. Lowell Treasure, Box 46, Bethany, Mo.

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NEW JERSEY—For rent. Office space in internist's office. Share reception room and waiting room. Separate consultation room and separate operating room. Dr. Victor Knapp, 505 Second Ave., Asbury Park, N. J.

•

NEW JERSEY—Active 10 year old general practice for sale. Large gross. Will stay as associate until introduced. Leaving state. Leonard Friedman, D.D.S., 380 Main St., East Orange, N. J.

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NEW JERSEY—For sale, terms arranged, selling because of death of dentist. Established 15 year practice. Residential town, ideal living conditions for family. Large office space including lab. Opportunity unlimited. Address A.D.A. Box No. 444.

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NEW YORK—For rent. Dental office space with general practitioner. Good location. Reasonable rent. Write H. J. Sliski, M.D., 1040 W. Genesee St., Syracuse 4, N. Y. or phone 3-7755 or 8-0751.

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NEW YORK—For sale. Gracious center hall Dutch colonial, 8 rooms, 3 baths. Beautifully landscaped, excellent residential, one-half acre. Office has 5 rooms, 2 operating rooms, tiled floor to ceiling, completely air conditioned. Dr. J. E. Bloom, 68 Cathedral Ave., Hempstead, N. Y.

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NEW YORK—For sale. Well established transferable practice, equipment. Beautifully modern, air-conditioned, custom-built model office. Medium large city, upstate New York. Rock steady employment, depression proof. Excellent opportunity. Leaving state. Address A.D.A. Box No. 402.

NEW YORK—For sale. Immediate occupancy. Have fully equipped office combination. Modern school. Commuters' town near Syracuse, N. Y. Active practice in rapidly expanding community. Low overhead. Full particulars upon request. Terms. Address A.D.A. Box No. 447.

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NORTH DAKOTA—Opportunity to rent office space in medical clinic. Share stenographer and receptionist, etc. Write Tri-State Clinic, Bowman, N. D.

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OHIO—For sale. Dental office in small town, located in bank building. Only dentist in community. Dentist deceased. Write Dr. J. W. Sellers, 201 S. Main St., Mt. Vernon, Ohio.

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PENNSYLVANIA—For sale. Lucrative suburban practice located in rich industrial city between Philadelphia and New York. Two-chair office, modern living quarters plus $2,100 yearly rent. Price $35,000. Will stay to introduce patients and help finance. $15,000 down. Address A.D.A. Box No. 448.

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PENNSYLVANIA—For sale. Fully equipped office, laboratory and waiting room. Dentist in service. Thriving community with large drawing area in western Pennsylvania. Office and home combination may be either bought or rented. Address A.D.A. Box No. 406.

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SOUTH DAKOTA—For sale. Modern three chair office, 2 x-rays, Hydro-flow equipped, complete laboratory, in modern bungalow. Three bedroom home two blocks from office, county seat town, only dentist in county. May take possession by January. Write Dr. A. W. Hermann, 231 Custer Ave., Custer, S. D.

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TEXAS—For sale. Two-chair office, established practice. Modern building new area downtown Houston. Population in excess of 30,000 within one block. Moving out of county because of other prevalent interests. Address A.D.A. Box No. 428.

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OKLAHOMA — Completely equipped two operatory office in Vinita, Oklahoma for sale. Growing town of 6,000 with three dentists. Laboratory, reception room, master S. S. White units, x-ray. Contact Dr. C. D. Tyler, Box 20068, Houston 25, Texas.

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WASHINGTON—For sale. Active practice, fully equipped, in Puget Sound city. Owner retiring, price and terms no object, to conscientious operator. Address A.D.A. Box No. 434.

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WEST VIRGINIA—For sale. Long established, centrally located, modern, two-chair office. X-ray, reception room, laboratory and business office, drawing population 15,000. Sistersville; halfway between Wheeling and Parkersburg along Ohio River. Moving to Florida. $4,000. Address Dr. R. C. Steele, Sistersville, W. Va.

OPPORTUNITIES AVAILABLE

Dentists

CALIFORNIA—Southern. Wanted. Pedodontist to replace associate leaving around November 1. Dr. L. F. Parker, 6919 Magnolia Ave. Riverside, Calif.

CONNECTICUT——Why wait ten years to build your practice from scratch. I want an ambitious associate with ability to take over all my general practice. Make money from the first day with a view to full partnership or purchase. Am going to limit my work to orthodontics. Prime location, downtown, in large Connecticut city. Address A.D.A. Box No. 367.

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GEORGIA—Wanted. Dentist to join two others in group practice. Established ten years. Start immediately. No investment needed. Medium sized town in western Georgia. Address A.D.A. Box No. 445.

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IOWA—Oral surgeon, desires associate full time. Must have had formal training and be eligible for Board of Oral Surgery examination. State age, qualifications, references, etc. Address A.D.A. Box No. 449.

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MARYLAND—Associate wanted in large established practice. Begin around November. Immediate income. Address A.D.A. Box No. 452.

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MONTANA—Dentist badly needed to take over flourishing practice in northeast Montana. Progressive wheat, ranching, and oil development area. Office and housing no problem. Contact Chamber of Commerce, Poplar, Mont.

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NEW JERSEY—Wanted, associate for active practice established 20 years, in central New Jersey. Applicant can progress to full partnership or purchase. Immediate income. Three-chair, modern air-conditioned office, two assistants. Address A.D.A. Box No. 450.

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NEW JERSEY—Fast growing metropolitan community in Morris County, N. J., where dentists are urgently needed. Only 30 minutes from Times Square. Offering six room doctor's colonial, jalousied porch, garage, ¾ acre beautifully landscaped. Only $26,500. Easy terms. Abe Schwartz, 44 N. Beverwcyk Rd., Lake Hiawatha, N. J.

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NEW YORK—Dentist wanted. Must be eligible for New York State boards. License not required. Salary $4,780. Opportunity for advancement. Apply Director, Newark State School, Newark, N. Y.

•

NORTH CAROLINA—Desire young, military exempt, dentist to locate in community of Claremont, North Carolina. Lions Club will sponsor and assist in equipping office. Excellent opportunity for right man. Contact John A. Busbee, Claremont, N. C.

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NORTH DAKOTA—Excellent opportunity for an experienced dentist to join medical group as partner, after one year of guaranteed salary. Starting salary $600 per month, plus percentage. (Other arrangements can be made.) Equipment modern. Two chairs. North Dakota license necessary. Start immediately. Martin Hochhauser, M.D., Garrison Clinic, Garrison, N. D.

NORTH DAKOTA—Washburn desperately needs dentist. Space available in new and modern medical building. Wonderful opportunity for dentist with very little investment necessary. Write or call E. W. Chase, Washburn, N. D.

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OREGON—Dentist wanted. An attractive dental practice available in Umatilla. Trade area population about 15,000. A growing town with district hospital and fine physicians, but no dentist. Immediate practice assured. Office space available. For more information write to C. F. Golde, President, Umatilla Chamber of Commerce, Umatilla, Ore. Phone 719 or 731.

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SOUTH CAROLINA—Opportunity knocks. Town of 2,100 with populous trade territory is without dentist. We offer modern two story brick home, offices combined, to dentist desiring good income, friendly community, and little expenses. Write Dr. Compere, Secretary, Blacksburg Chamber of Commerce, Blacksburg, S. C.

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WASHINGTON—Dentists for foreign missionary work. Excellent opportunities for qualified men in all parts of the world. For details apply to The Missionary Dentists, 5543 25th Ave., N.E., Seattle 5.

Hygienists

FLORIDA — Wanted hygienist. Excellent opportunity for ambitious young lady in lower east coast city. Permanent position in modern, air-conditioned, three chair office. Good working hours and salary. Address A.D.A. Box No. 411.

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INDIANA—Wanted: Dental hygienist. Must know x-ray technique and thorough prophylaxis. Also wanted: Laboratory technician. Must do good set-ups and finishing and be capable of gold work. Indiana city of 80,000. Write 317 W. Washington St., Muncie, Ind.

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NEW JERSEY—Trenton. Hygienist wanted. Excellent working conditions. Good salary. Address A.D.A. Box No. 451.

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SOUTH CAROLINA—Greenville. Hygienist wanted. New modern air-conditioned office. Busy general practice. Private hygienist's operatory. Liberal salary or commission. Hygienist's duties only. Address Morton T. Edwards, D.M.D., 12 S. Calhoun St., Doctors' Building, Greenville, S. C.

OPPORTUNITIES WANTED

Florida. General practitioner, 17 years' experience, all phases, desires purchase active practice, Miami vicinity. Would consider association, ultimate partnership. Capable, personable, reliable, married, sober, draft-exempt. Engaged successful private practice presently. Address A.D.A. Box No. 382.

•

Massachusetts licensed dentist. Complete military obligation August 1957. Desires practice in medium size city or suburban location. Experienced in exodontics and pedodontics. Has National Boards—will take other boards. Dr. James M. Stewart, 72 Warner St., Hudson, Mass.

Mature, conscientious, 1953 graduate, taking postgraduate training, desires evening and week-end position in Philadelphia, preferable with oral surgeon. Training: one year internship in oral surgery, plus two years' service experience. Available September. Address A.D.A. Box No. 421.

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Pennsylvania licensed dentist interested in purchase or association leading to purchase of active private practice. Have extensive experience in general dentistry and prosthetics. Address A.D.A. Box No. 413.

•

Orthodontist—desires location or association. University trained. Private practice 20 years. National Board. Address A.D.A. Box No. 427.

•

Dentist, Pennsylvania licensed, capable, wide experience as general practitioner, draft-exempt, desires association with possible purchase, or to purchase office in Pittsburgh, Philadelphia, or Bucks County. Give full details, replies confidential. Address A.D.A. Box No. 435.

•

Pennsylvania licensed, 34, military obligation fulfilled, six years busy private practice. Experienced in all phases including periodontics, minor oral surgery, roentgenography and minor orthodontics. Four years' hospital exodontics and surgery as surgeon. Reason for desiring change is my income is not commensurate with quality of services and long hours. Prefer association with oral surgeon or group practice. Address A.D.A. Box No. 439.

•

General practitioner, Illinois licensed, service completed in September, 10 years of private practice, desires to purchase well established active practice in Illinois. Home-office combination preferred. Replies strictly confidential. Address A.D.A. Box No. 441.

•

Ohio licensed dentist, completing military obligation this November, desires government, clinic, private or industrial association for from one to two years in Columbus area. Would prefer maintaining practice of dentist who must enter military service. Address A.D.A. Box No. 442.

WANTED TO BUY

Old or used dental books, journals, prints. Leo L. Bruder, 1 DeKalb Ave., Dept. 21, Brooklyn, N. Y. Dealer in out-of-print dental literature.

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Heidbrink Model B-53 with CO_2 yoke and gauge. Has patient-control analgesia valve. Two high pressure regulators included. Mobile stand not included. F.O.B. Salt Lake City. $150.00. K. L. Dedekind, D.D.S., 914 Medical Arts Bldg., Salt Lake City, Utah.

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Dental Cosmos—volume 1 through 67, with the exception of 3, 5, & 6. Dr. Marvin A. Bregman, 101 Hillside Ave., Williston Park, N. Y.

•

For sale. No. 3 S. S. White unit, No. 2 Ritter chair, black Pelton light, just rechromed and repainted green. Excellent running condition. $300 for everything. P. O. Box 268, Fair Oaks, Calif.

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For sale. Ritter Model E unit, S. S. White motor chair, wash, blue, Castle Panovision light, American cabinet, cuspidor and miscellaneous equipment. All equipment bought 1952. For details write Dr. Glandon, 1601 McHenry Village Way, Modesto, Calif.

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Antique dental instruments for sale. A complete set of mother-of-pearl handled instruments used in Mississippi around 1835-1850. In good shape with original case. Address A.D.A. Box No. 433.

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For sale. Air-Dent unit; late model, excellent condition. Nozzles, tanks and instructions included. Will accept first reasonable offer. Located in Pennsylvania. Address A.D.A. Box No. 436.

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For sale. Air-dent. Excellent condition, cream white, all accessories including arm. Send me your bid. Dr. Justin Lee Altshuler, 68 Bay State Rd., Boston, Mass.

MISCELLANEOUS

General Refresher Course, 828—A general review course in dentistry will be offered by the Dental Program, University of California Extension starting November 19 and continuing for eight weeks. Didactic lectures in the following subjects will be given: Anatomy, anesthesia, biochemistry, organic and inorganic chemistry, crown and bridgework, dental materials, histology, materia medica, metallurgy, operative dentistry, orthodontics, oral diagnosis, oral surgery, pathology, pedodontics, prosthetics, physiology, roentgenology, therapeutics. More than one half of the time will be devoted to laboratory technics and clinical procedures with patients. Further information may be obtained from: J. Eugene Ziegler, D.D.S., Head, Dental Program, University of California Extension, 815 S. Hill St., Room 211, Los Angeles 14.

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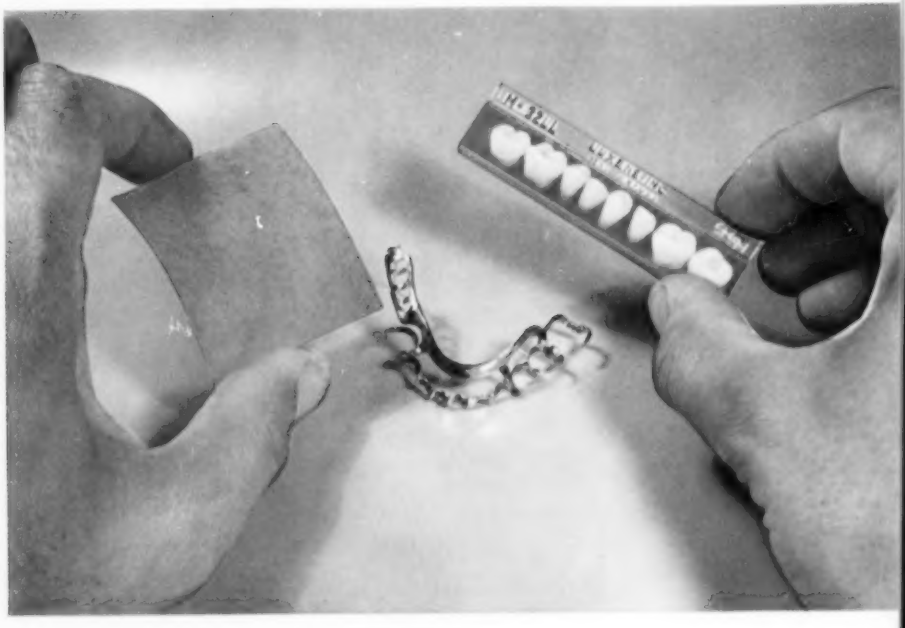

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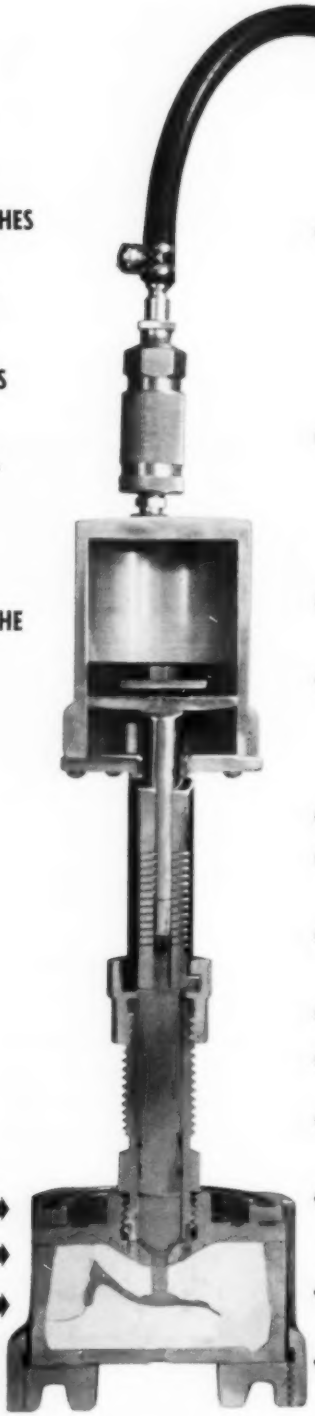

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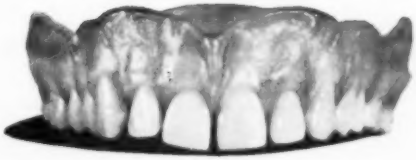

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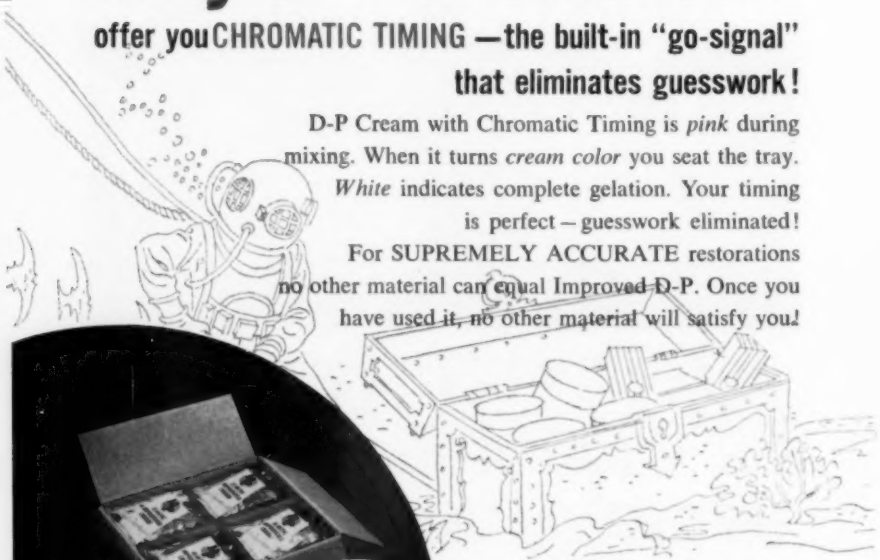

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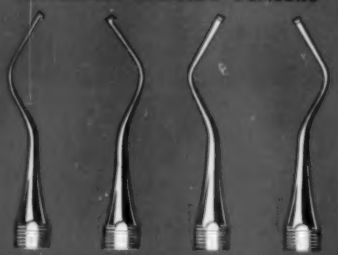

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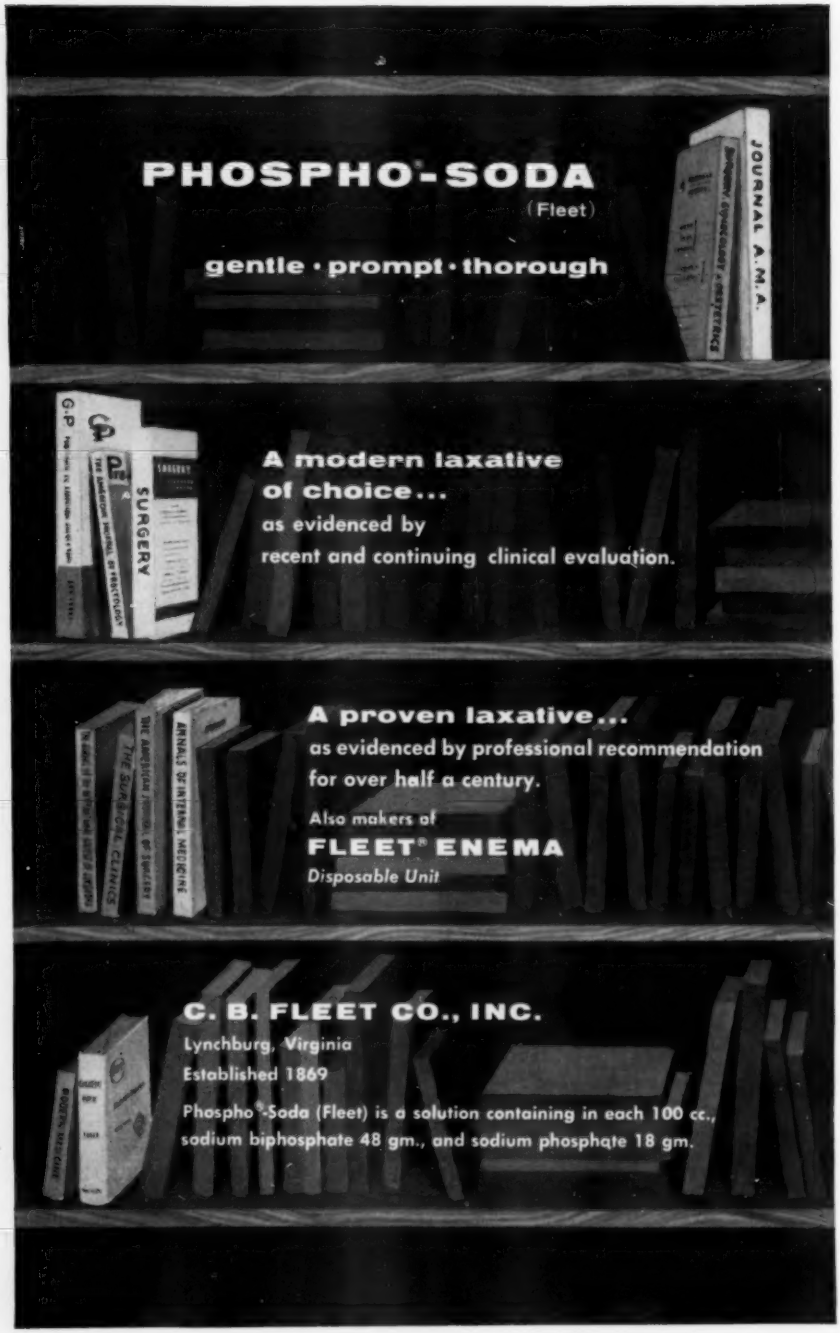
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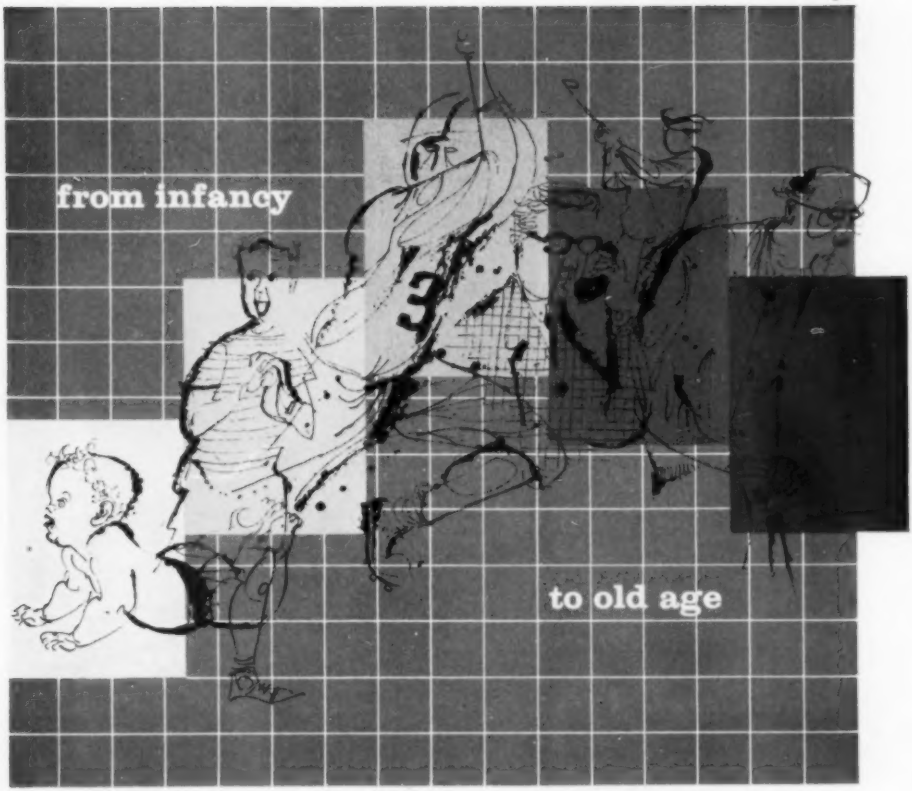

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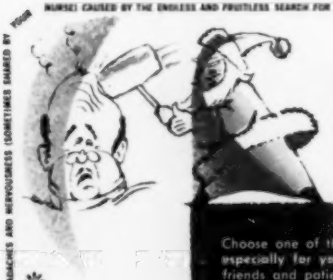

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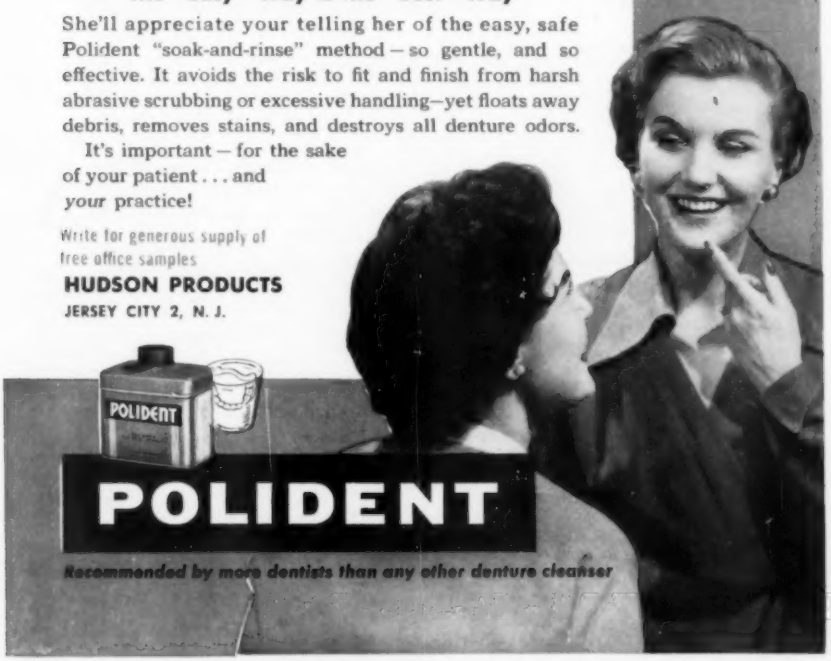

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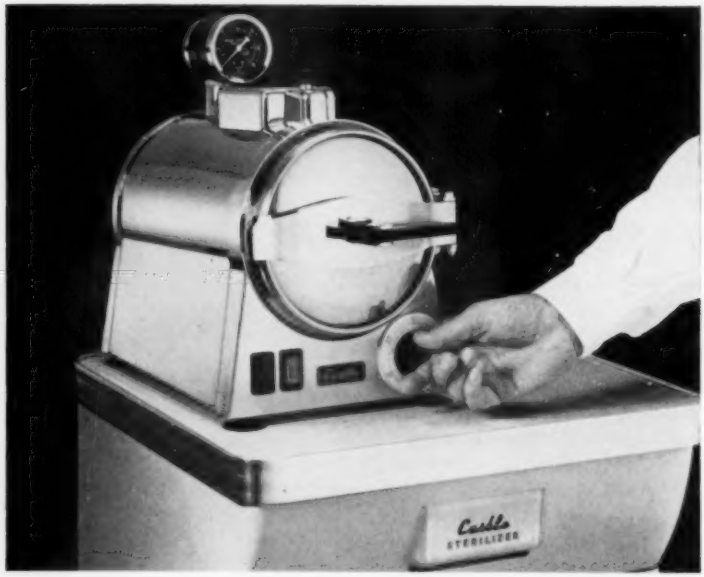

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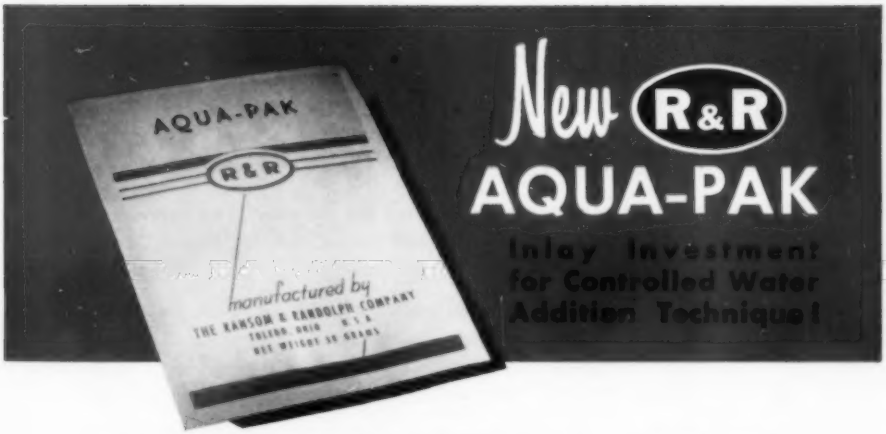

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The Role of Enriched Bread in Sound Nutrition

Is bread cariogenic?

A scientifically valid answer has recently been expressed by the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association:

"Available evidence indicates that starchy carbohydrates are of minor importance in the process of caries since complex carbohydrates cannot diffuse into bacterial plaques and cannot be degraded promptly to simple sugars in most mouths."[1]

The complex carbohydrate of enriched white bread thus does not appear to be a contributing factor to caries.

Limited dental observations[2] for 10 months on 101 German orphanage children fed diets providing 75 per cent of their calories in the forms of enriched and unenriched white breads and whole wheat bread are not inconsistent with this view.

In addition, "One of the most striking findings...and perhaps the most unexpected one, was the remarkable way in which the general condition of all the children...improved...[The diets fed] provided undernourished children aged 5-15 years with all the nutrients required for a high rate of growth and development for a period of 18 months."[2]

Enriched bread owes its high nutritional value to its contained protein (39 grams per pound loaf), B vitamins, iron, calcium, and nutrient energy. On the average its commercial formula includes nonfat milk solids, 4 grams per 100 grams of flour. The protein of such enriched bread, consisting of flour protein supplemented by milk and yeast proteins, supports both good growth and maintenance of tissues.

1. Joint Report of the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association: Sugar and Dental Caries: The Effect on the Teeth of Sweetened Beverages and Other Sugar-Containing Substances, J. Am. Dent. A. 47:387 (Oct.) 1953.
2. Widdowson, E. M., and McCance, R. A.: Studies on the Nutritive Value of Bread and on the Effect of Variations in the Extraction Rate of Flour on the Growth of Undernourished Children, Medical Research Council, Special Report Series, No. 287, London, Her Majesty's Stationery Office, 1954.

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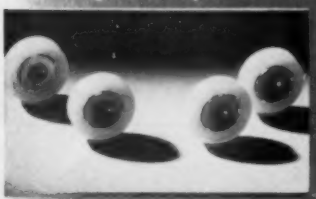

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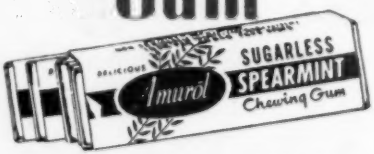

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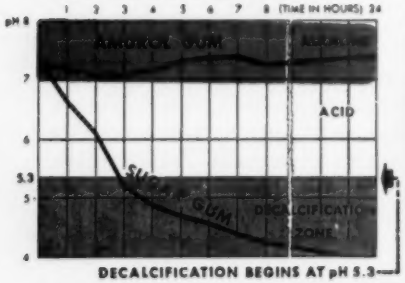

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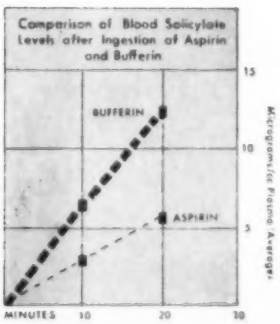

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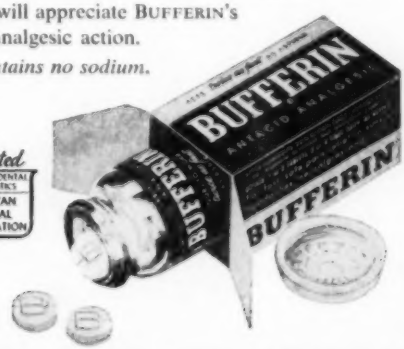

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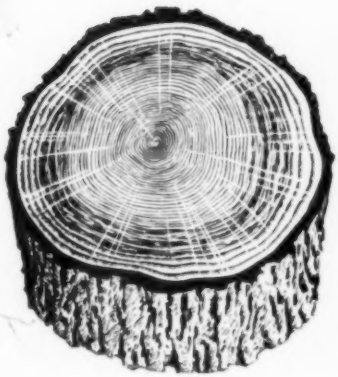
BRISTOL-MYERS CO., 19 W. 50 St., New York 20, New York

STRENGTH FROM STRUCTURE



Who hasn't seen *strength* in the *structure* of a tree? Just cut across a mighty trunk to find the secret—one year's growth bonded to another in a slow natural process that welds, compresses and laminates at the same time . . .

Nature develops the strength of natural teeth in much the same way by building a dense, homogenous internal structure. A similar internal structure is necessary to achieve greater strength in artificial porcelain teeth.

Only the vacuum fired porcelain of Trubyte Bioform Teeth has a dense, homogenous structure comparable to that of natural teeth. This exclusive Trubyte Bioform process creates not only *stronger* teeth, but more *natural, vital* and *lifelike teeth.*

The greater strength and beautiful esthetics of Trubyte Bioform Vacuum Fired Porcelain offers a *new* opportunity for increased success in modern professional denture service.

CONVENTIONAL AIR FIRED PORCELAIN

TRUBYTE BIOFORM VACUUM FIRED PORCELAIN

Note in these two micro-photographs how the denser, more homogenous structure of vacuum fired porcelain is substantially free from the voids and bubbles found in conventional porcelain.

trubyte Bioform® teeth

the first "vacuum fired porcelain" teeth

THE DENTISTS' SUPPLY COMPANY OF N. Y.

YORK, PENNSYLVANIA